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WAR MACHINE

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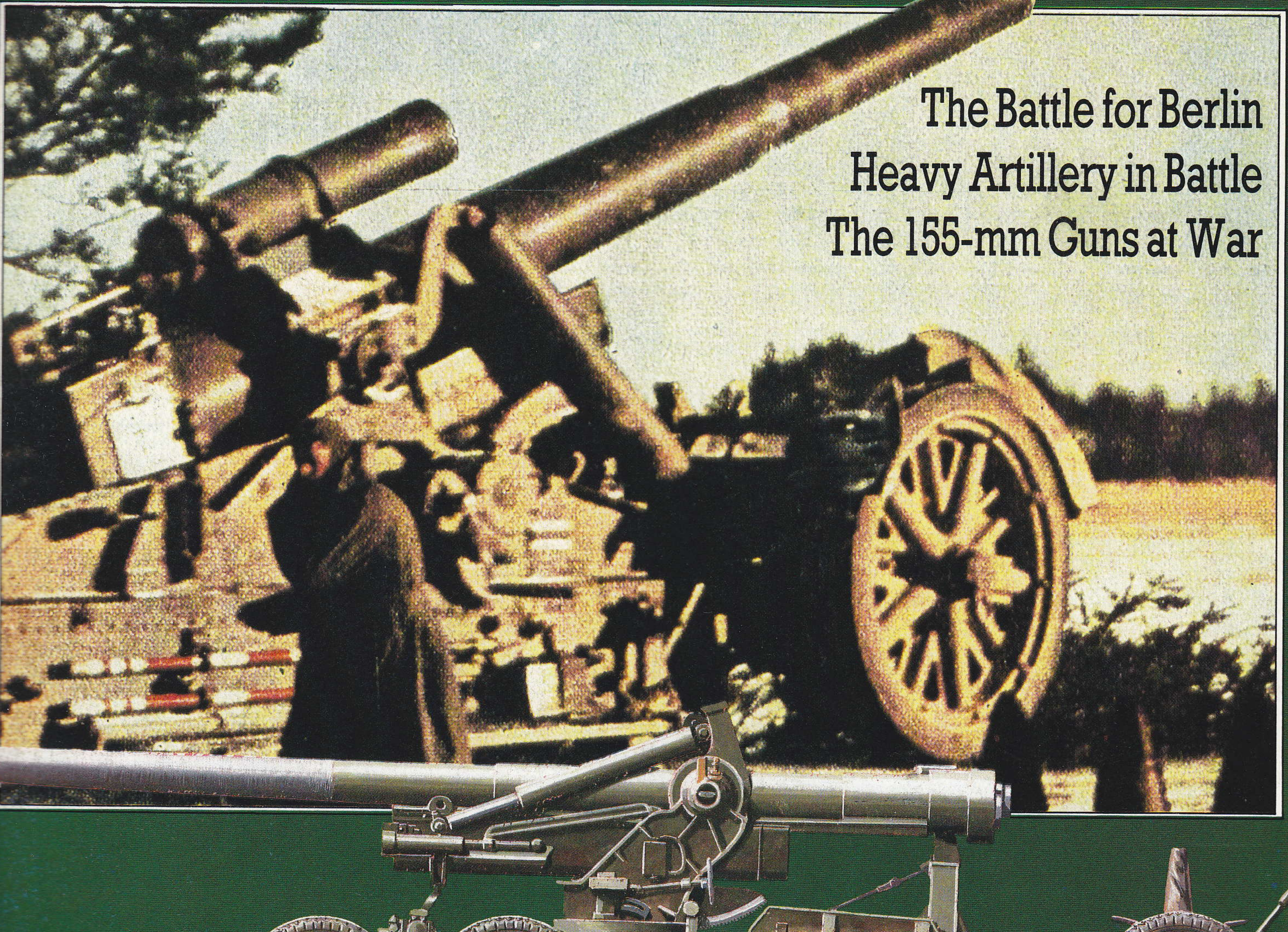

The Battle for Berlin

Heavy Artillery in Battle

The 155-mm Guns at War

A fully illustrated guide to Heavy Artillery of World War II

WAR MACHINE

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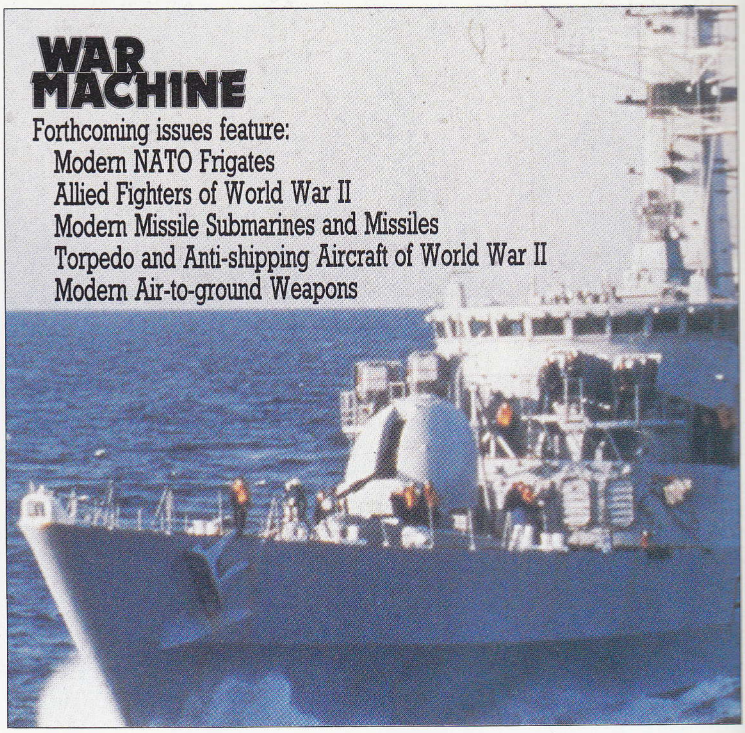

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CZECHOSLOVAKIA

Skoda 149-mm vz 37 howitzer (K4)

The high water mark of German success in the late summer of 1942: elements of Army Group A penetrated over 300 km (200 miles) south-east of Stalingrad. Here a Czech-built vz 37 15-cm howitzer pounds Soviet positions in the foothills of the Caucasian mountain range.

By the early 1930s the Skoda works at Pilsen in Czechoslovakia were in a position to design, develop and produce entirely new artillery pieces that owed nothing to the old World War I weapons that had hitherto been the company's main output. By 1933 they had produced, among other things, an entirely new 149-mm (5.87-in) range of howitzers known as the 'K' series. The first of these, the **K1**, was produced in 1933 and the entire output of these **vz 33** weapons went for export to Turkey, Romania and Yugoslavia. The K1 was a thoroughly modern piece with a heavy split trail, and was designed for either horse or motorized traction. For the latter the piece could be towed as one load, but for the former the barrel could be removed for towing as a separate load.

Despite the success of the K1, the Czech army decided that the weapon did not meet its exact requirements and funded further development to the stage where a **K4** model met the specification. The K4 had much in common with the earlier K1, but had a shorter barrel and (as the Czech army was making considerable strides towards full mechanization) the need for removing the barrel for separate horse traction was no longer required. The K4 also used pneumatic wheels (the K1 had solid rubber-rimmed steel wheels) and some other modifications to suit it for the mechanized tractor-towing role.

With these changes the Czech army decided to adopt the K4 as its standard heavy field howitzer to replace the large range of elderly weapons remaining from World War I. The K4 was given the army designation **15-cm hrubá houfnice vz 37**, vz 37 (vz for *vzor*, or model) denoting the equipment's year of acceptance for service. Skoda drew up production plans, but as always this took time and in the interim the Germans occupied the Czech Sudetenland. Plans for production became even more frantic, but with the Sudetenland line of defences in German hands Czechoslovakia was wide open to further German aggression and in 1939 they duly marched in to take over the rest of the country.

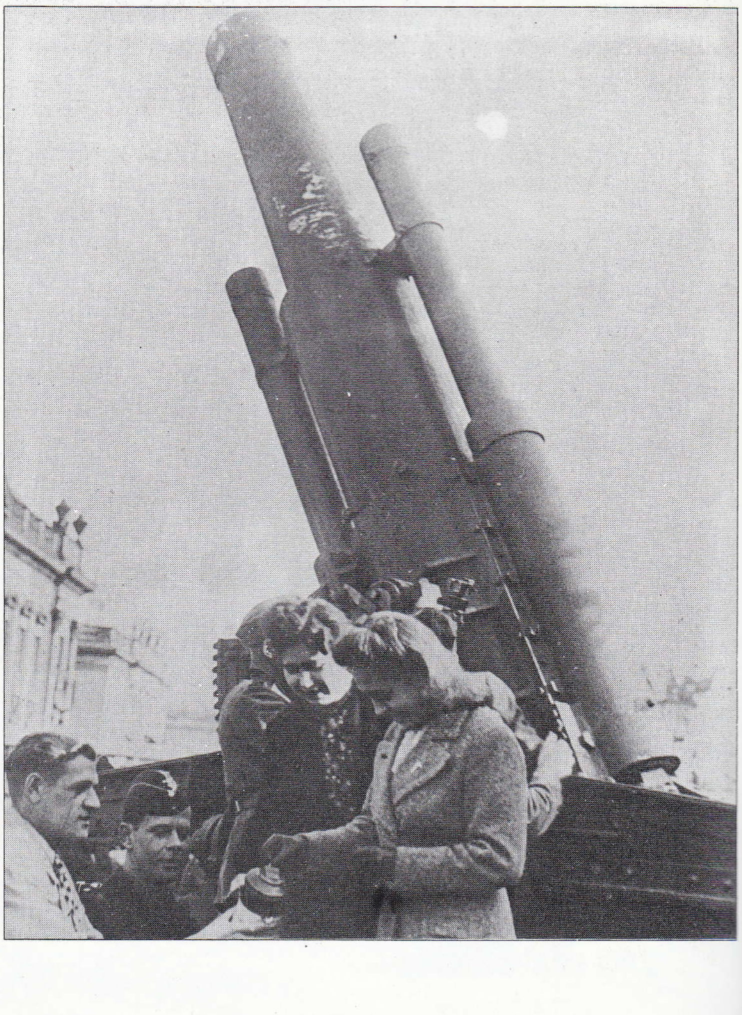
The Germans also secured the Skoda works at Pilsen, finding on the production lines the first of the full production vz 37 weapons. By that time only a few models had been produced, and these the German army tested on ranges back in the Reich, discovering that the vz 37 was a sound and serviceable howitzer with a good range of 15100 m (16,515 yards) and firing a very useful 42-kg (92.6-lb) projectile. The Germans decided to keep the vz 37 in production at Pilsen for their own requirements, and thus the vz 37 became the German army's **15-cm schwere Feldhaubitze 37(t)**, or 15-cm heavy field howitzer Model 1937 (Czech), the (t) denoting *tschechisch*, or Czech. With the German army the sFH 37(t) became a standard weapon of many divisions, forming part of the divisional artillery equipment and even being used by some corps batteries. It was used during the French campaign of May and June 1940, and later in the invasion of the Soviet Union during 1941. Some were still in service in the Soviet Union as late as 1944, but by then many had been passed to the various Balkan forces under German control and operating within what is now Yugoslavia; the Slovak army was one such recipient.

Specification

SFH 37(t)
Calibre: 149.1 mm (5.87 in)
Length of piece: 3.60 m (11 ft 9.7 in)
Weight: travelling 5730 kg (12,632 lb) and in action 5200 kg (11,464 lb)
Elevation: −5° to +70°
Traverse: 45°
Muzzle velocity: 580 m (1,903 ft) per second
Maximum range: 15100 m (16,515 yards)
Shell weight: 42 kg (92.6 lb)

CZECHOSLOVAKIA

Skoda 220-mm howitzer



Skoda produced some of the best heavy artillery pieces of World War I, and continued the tradition with the 220-mm howitzer, which was exported to both Poland and Yugoslavia. After the Germans invaded Eastern Europe they used the captured weapons against the fortress of Sevastopol.

Whereas the Skoda vz 37 howitzer was a completely new design, the slightly earlier **Skoda 220-mm howitzer** was very much a product that had its origins in earlier days. In the period up to 1918, when the Skoda works were the largest armament producers for the Austro-Hungarian empire, the Pilsen works had been only slightly behind the German Krupp concern in the manufacture of really heavy artillery, and the heavy Skoda howitzers were second to none in overall efficiency. Thus when the Skoda works started production again the 'classic' howitzer was one of its main products.

However, the accent was no longer on heavy calibres alone. Despite their dreadful efficiency in demolishing fortifications, such equipments were ponderous beasts to move and their rate of fire was extremely slow. They were also fearfully expensive, so when some of the new nations formed after the Treaty of Versailles started to arm themselves against a difficult future they still wanted heavy artillery, but not too heavy. An interim calibre of about 220 mm (8.66 in) was still about right for the destruction of heavy structures, but the howitzer itself need not be too ponderous. Skoda sensed the market and produced the required 220-mm design incorporating much of its considerable experience in such matters, and it was not long before customers arrived.

The first was Yugoslavia, formed from several of the pre-World War I Balkan states. The new nation decided it had much to fear from its neighbours, and thus was involved in numerous purchases of weapons of all kinds throughout Europe. Yugoslavia was a good customer of Skoda, and in 1928 took delivery of a batch of 12 220-mm Skoda howitzers under the designation **M.28**. Another customer was Poland, which ordered no less than 27. These Polish howitzers featured prominently in many pre-war propaganda photographs of the Polish army, all with one feature in common: in all of these photographs the breech mechanism was obscured in some way, usually by a soldier, as part of the normal Polish security procedure in any artillery illustration intended for publication.

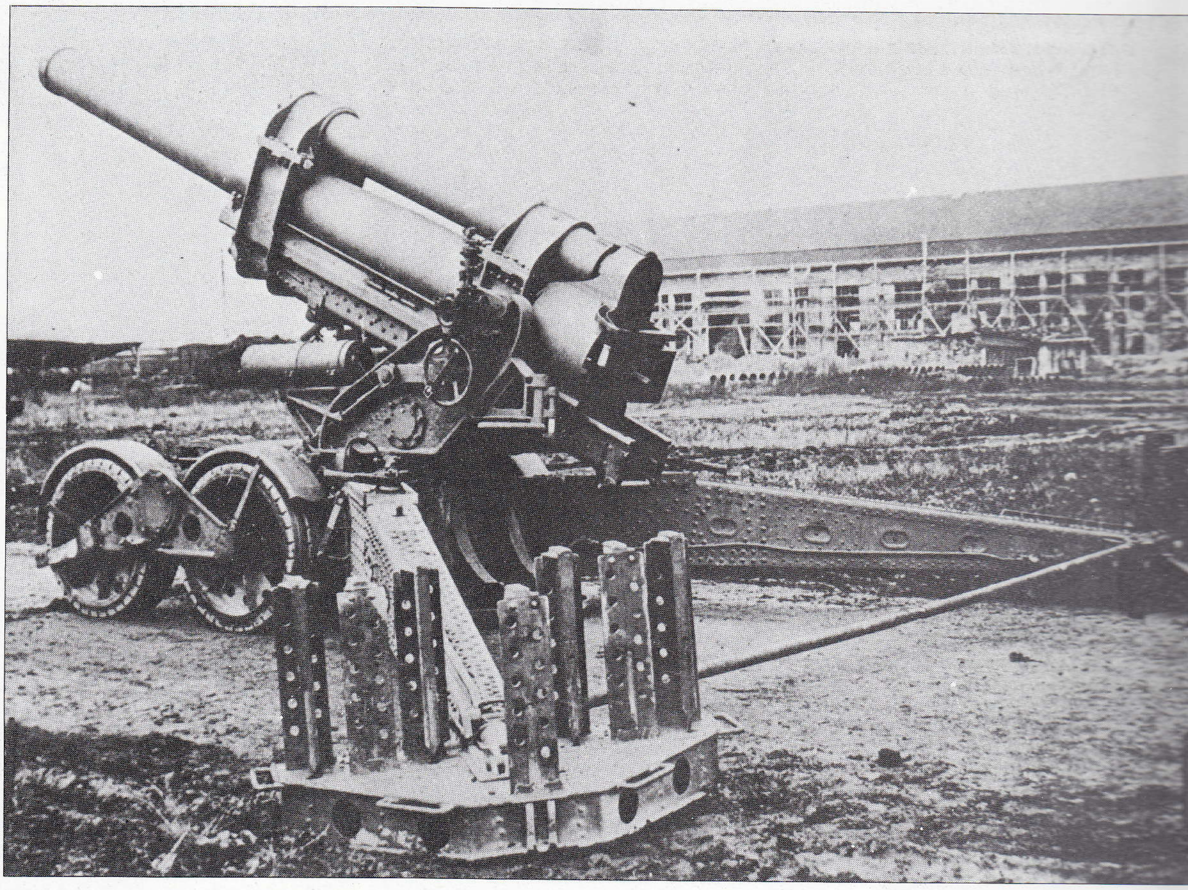
It did the Poles no good, for in 1939 the Germans invaded and captured or destroyed the entire Polish gun park. The unfortunate Yugoslavs followed just over a year later. Thus the Germans found themselves with a useful quantity of 220-mm howitzers, which promptly became part of the German army's inventory. There was not much of a role for such a relatively heavy piece in the German *Blitzkrieg* concept, so the captured howitzers were distributed mainly to garrison and static units in the occupied territories. Some of these were as distant as Norway, but in late 1941 a number of these howitzers were gathered together and added to the siege train that was sent to invest the fortress of Sevastopol in the Crimea. This was the last classic investment of a fortress by the age-old method of assembling and using a siege train, and the fortress fell after the Skoda howitzers had played a useful part. Thereafter they were once more scattered and saw little use during the remainder of the conflict.

Specification

Skoda 220-mm howitzer
Calibre: 220 mm (8.66 in)
Length of piece: 4.34 m (14 ft 2.8 in)
Weight: travelling 22700 kg (50,045 lb) and in action 14700 kg (32,408 lb)
Elevation: +40° to +70°
Traverse: 350°
Muzzle velocity: 500 m (1,640 ft) per second
Maximum range: 14200 m (15,530 yards)
Shell weight: 128 kg (282.19 lb)

ITALY

Obice da 210/22 modello 35



Italy made extensive use of heavy artillery in World War I, but by the 1930s her big guns were looking decidedly obsolete and new weapons were ordered. The 210-mm howitzer pictured here was an excellent design, but Italian industry could not produce the guns with sufficient speed.

During the late 1930s the Italian army decided to attempt to replace the bulk of its heavy artillery park, which by that time resembled an oversize artillery museum. It selected two good and thoroughly modern designs, one a gun with a calibre of 149 mm (5.87 in) and the other a howitzer with a calibre of 210 mm (8.26 in). The howitzer was designed by an army organization known as the Servizio Tecnici Armi e Munizioni (STAM), but production was carried out by Ansaldo at Pozzuoli.

The howitzer was known as the **Obice da 210/22 modello 35**. Although shown in prototype form in 1935, it was not accepted for service until 1938 when a production order for no less than 346 was placed. The modello 35 was a very sound and modern design. It used a split-trail carriage with two road wheels on each side. When the howitzer went into action these wheels were raised off the ground and the weight was assumed by a firing platform under the main axle. The entire weapon could then be traversed easily through 360° once the stakes that anchored the trail spades to the ground had been raised.

The main problem for the Italians was that having designed a first-rate howitzer they could not produce it quickly enough. Despite the good intentions of the Italian army, it had to enter the war with its antique gun park still largely undisturbed by modern equipments, and by the autumn of 1942 the grand total of modello 35s was still only 20, five of them in Italy and the rest in action in the Soviet Union. Part of this state of affairs was due to the fact that despite the requirements of the Italian army, modello 35s were sold to Hungary as they came off the production line, no doubt in exchange for raw materials and food products. The Hungarians found it necessary to make their own carriage modifications to suit this **21-cm 39.M** to the rigours of their service and eventually set up their own **21-cm 40.M** and finally **21-cm 40a.M** production line in 1943.

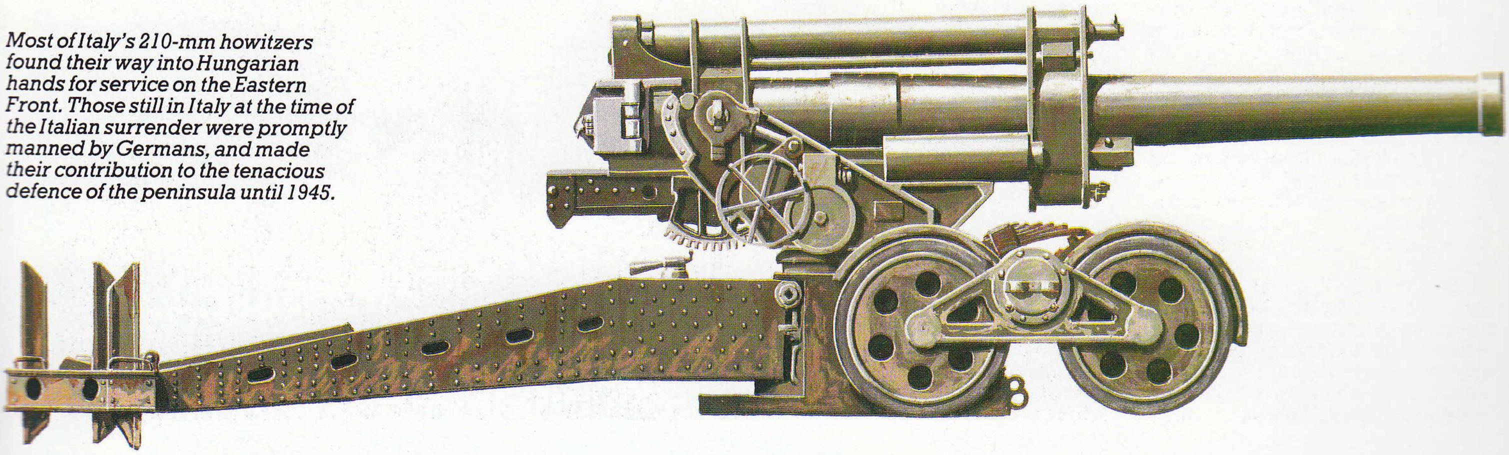
In service the modello 35 was successful enough. It could be transported in two loads, but for prolonged moves it could be further broken down into four loads with an extra load for assembly equipment and accessories. The modello 35 attracted the attentions of the Germans, and when the Italians surrendered in September 1943 the Ansaldo concern was forced to continue production for German units based in Italy. Thus the modello 35 became the **21-cm Haubitze 520(i)** and was still in action with the Germans when the war ended.

After 1945 attempts were made by Ansaldo to sell the modello 35 on the home and export markets. There were no takers as the home market was sated with American equipment that was freely supplied to the Italian army and war-surplus equipment was widely available elsewhere.

Specification

Obice da 210/22
Calibre: 210 mm (8.26 in)
Length of piece: 5 m (16 ft 4.85 in)
Weight: travelling (two loads) 24030 kg (52,977 lb) and in action 15885 kg (35,020 lb)
Elevation: 0° to +70°
Traverse: 75°
Muzzle velocity: 560 m (1,837 ft) per second
Maximum range: 15407 m (16,850 yards)
Shell weight: 101 or 133 kg (222.7 or 293.2 lb)

Most of Italy's 210-mm howitzers found their way into Hungarian hands for service on the Eastern Front. Those still in Italy at the time of the Italian surrender were promptly manned by Germans, and made their contribution to the tenacious defence of the peninsula until 1945.



Heavy Artillery in Battle

Despite the tactical developments since 1918, heavy artillery still had a vital role to play in World War II. Many battles became siege-like slogging matches, horribly similar to those of 1914-18. From Leningrad to Cassino, from Sevastopol to the Siegfried Line, armies dug themselves in so deeply that only big guns could blast a way through.

The classic role of heavy artillery in warfare is the destruction or neutralization of the enemy's fortifications and strongpoints, though in more recent times it has also included the destruction of the enemy's field and other artillery. In World War II both tasks were important. This may seem curious, for we have by now become used to the idea that World War II was a war of swift movement and armoured thrusts. But on many fronts this was not always the case: along many battlefronts campaigns often settled down into long periods of relative inactivity, and further advances and/or withdrawals were often prevented either by weather conditions or lack of resources on both sides. Under such conditions heavy artillery could once more resume its importance and make life as miserable and dangerous as possible for the enemy.

During World War II fortifications were still around. The best-known example is the French Maginot Line, but there were many others such as the old but nonetheless effective defences that ringed the port of Sevastopol and the ring of 19th century forts that defended Metz. These were still strong enough to stop the US 3rd Army in its tracks after Patton's rapid advances across France in 1944. It must not be forgotten that under modern conditions many large cities can become just as effective as fortifications in stopping the rapid advance of even armour-heavy forces. The examples of Stalingrad and Leningrad are still there for all to see, and under these conditions the only weapons that can be used to reduce such large-scale obstacles remain the heavy gun and the heavy howitzer.

Thus heavy artillery had a large part to play in many campaigns during World War II. Some of the weapons were rather elderly (to put it mildly), but most combatant nations had deemed it worthwhile to invest heavily in large-calibre artillery of all kinds.

One kind of heavy artillery that was relatively new was the specialized long-range counterbombardment gun. Experience gained during World War I was that enemy batteries had to be silenced during critical periods such as large-scale attacks (to prevent harassing fire on sensitive rear areas, for example). During World War I this role was often assumed by railway artillery, but in World War II the specialized long-range guns often weighed in for this purpose. Typical of these long-range guns was the German 24-cm (9.45-in) Kanone 3, which was really a case of overkill for the targets against which weapons such as the American 155-mm (6.1-in) Gun M1 or the German 15-cm (5.9-in) Kanone 18 were more than adequate.

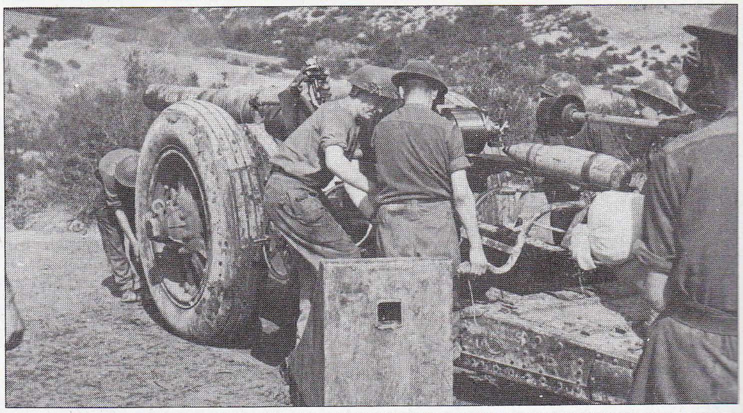
But among the heavy artillery types the howitzer tended to predominate over the gun, for with its higher projectile trajectory and flexible system of propellant charges the howitzer was often a far more useful weapon than the gun. The gun certainly had the greater range, but it often had to use a flat trajectory at times when plunging fire would have far more effect on the types of target involved, such as strongpoints or bunkers. By 1945 artillery developments were such that the range discrepancy between guns and howitzers were not all that marked, the howitzer's shorter range being frequently offset by its heavier projectiles.

Another World War II innovation was the introduction of the gun-howitzer in which a variable propellant system could be allied with the ability to use either direct fire or fire in the upper register, i.e. at high angles of elevation to produce plunging fire. Typical of such weapons was the Soviet 152-mm (6-in) Model 137 gun-howitzer.

For all these technicalities the imagination is still attracted by the sheer scale of weapons such as the German 35.5-cm (14-in) M1 or intrigued by such technical freaks as the American 'Little David' with its huge 914-mm (36-in) calibre. No doubt it would be possible to formulate viable reasons why such oddities should exist in an era dominated by the tank and the heavy bomber, but it is still something of a challenge. Although such monsters survived until 1945 (and were even under further development at that time) the truth was that their day was well past. Perhaps the greatest indication that their era was over can be seen in the example of the greatest protagonist of heavy artillery during World War II, namely the Red Army. It used nothing larger than the 203-mm (8-in) Model 1931 howitzer from the beginning to the end. Rather than relying on a few super-heavy weapons spread thinly (which was usually the case for most other combatants who had such weapons), the Red Army relied instead on the principle of mass, using large numbers of heavy artillery batteries to deliver streams of heavy projectiles, both against fortified areas and against the enemy's answering batteries. And the Red Army won.

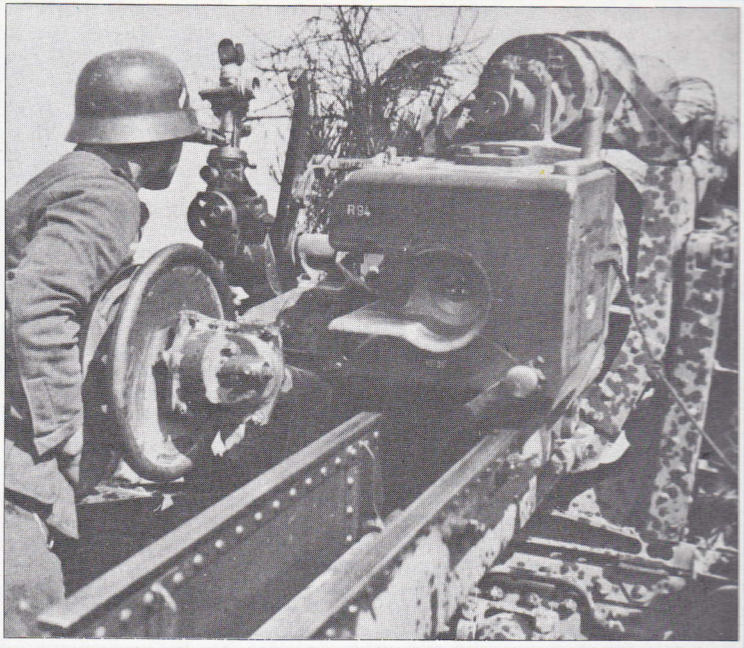
Connected by field telephone to the gun battery, the Forward Observation Post reports the map reference of the target and will spot the fall of shot. These Russians have dug themselves a deep slit trench to escape a German counter-barrage designed to 'blind' the Soviet guns.

The heavy guns were sited several miles behind the lines to avoid the unwelcome attentions of enemy field guns and mortars, so target information had to be relayed back to the gunners by forward observers, like the Afrika Korps team shown here.



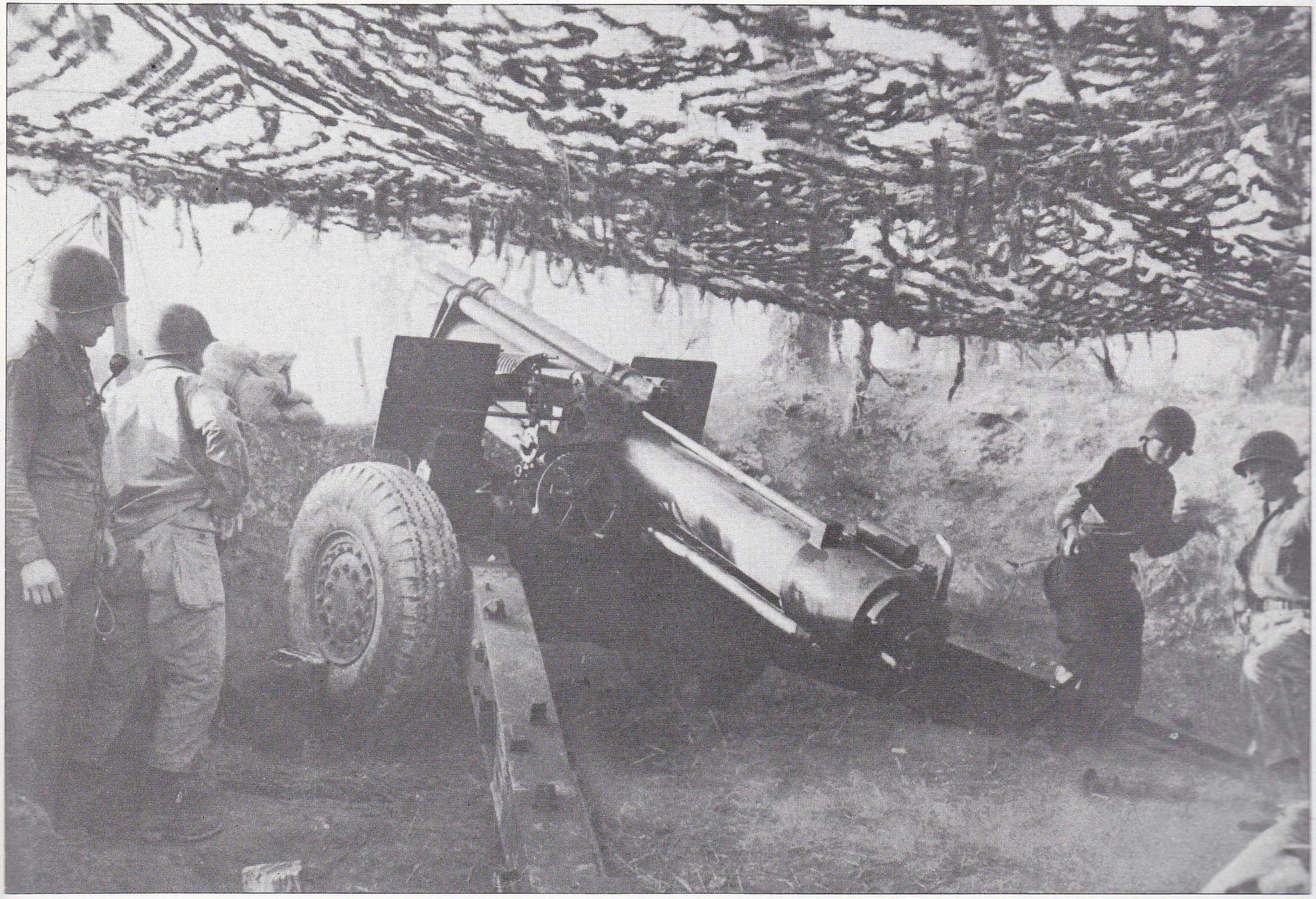
The British 7.2-in howitzer could fling its 91.7-kg (202-lb) shell nearly 18 km (11 miles), but manoeuvring it the few yards to the breech was the hard bit. It had a vicious recoil, requiring blocks like the one in the foreground to be placed behind for the wheels to run up.

A German battery on the Western Front in the spring of 1940: ready for a sustained bombardment, shells have been stockpiled near the guns so that a rapid rate of fire can be maintained. Before firing shells are removed from their wicker cases and the fuses set.



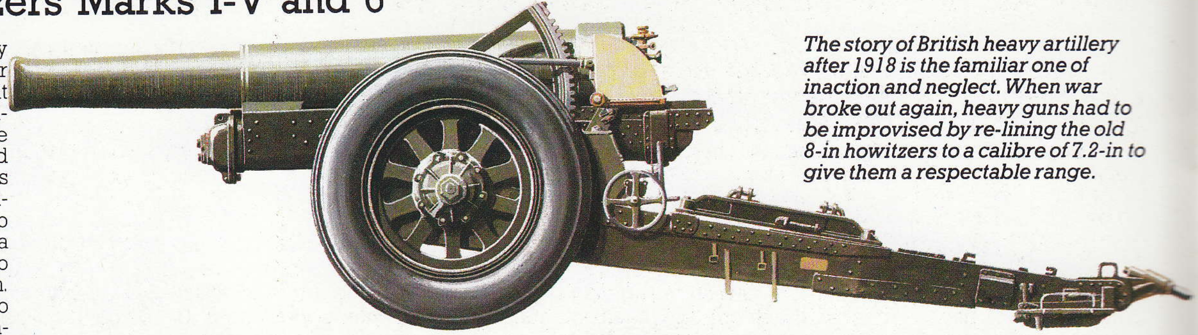
The tremendous forces unleashed by the firing of a heavy gun meant that unless the weapon possessed an efficient recoil system it would need frequent re-laying. This German gunner checks the sighting.

With a deafening roar, a US 155-mm howitzer hurls a 43-kg (93-lb) shell at German positions, Mount Porchia, Italy. Numbed by long-term exposure to the noise, the crew no longer attempt to protect their ears, which will suffer irreparable damage.



UK

7.2-in Howitzers Marks I-V and 6



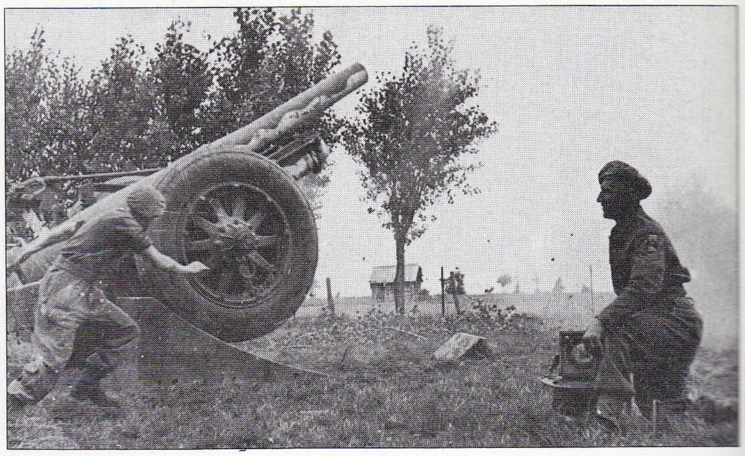
The story of British heavy artillery after 1918 is the familiar one of inaction and neglect. When war broke out again, heavy guns had to be improvised by re-lining the old 8-in howitzers to a calibre of 7.2-in to give them a respectable range.

Between the wars the British army tended to neglect artillery; a number of programmes were initiated but came to naught, so when heavy artillery was required in 1940 all that there was to hand was a quantity of old World War I 203-mm (8-in) howitzers with ranges too short for current conditions. As a stopgap it was decided to reline the existing 203-mm barrels to a new calibre of 183 mm (7.2 in) and to develop a new range of ammunition. The original 203-mm carriages were to be retained, but the old traction engine wheels were replaced by new pneumatic balloon-tyred wheels on what became known as the **7.2-in Howitzer**.

The new ammunition provided the conversion with a useful increase in range, but when the weapon fired the full charge the recoil forces were too much for the carriage to absorb. Firing the 7.2-in howitzer on full charge was a risky business, for the whole equipment tended to rear up and jump backwards. Before the next round could be fired the howitzer had to be manhandled back into position and re-laid. Some of this unwanted motion could be partly overcome by placing behind each wheel wedge-shaped ramps up which the howitzer and carriage could climb, only to roll down again into roughly the original position, but sometimes even these ramps were insufficient and the howitzer would jump over them. But the conversion proved to be an excellent projectile-delivery system capable of good range and a high degree of accuracy, to the extent that the gunners in the field called for more.

In order to provide more, the number of 8-in howitzer conversions eventually ran to six marks depending on the original barrel and type of conversion; some of the 8-in barrels came from the United States. The first 7.2-in howitzers were used in action during the latter period of the war in North Africa (they were the howitzers mentioned in Spike Milligan's hilarious military memoirs) and in Tunisia, went on to take part in the long slog north through Sicily and Italy, and were used following the Normandy landings.

But by 1944 numbers of 7.2-in barrels were being placed on imported American M1 carriages. These excellent carriages proved to be just as suitable for the 7.2-in howitzer as they were for the American 155-mm (6.1-in) gun and 203-mm howitzers, and the first combination of a 7.2-in barrel with the M1 carriage was the **7.2-in Howitzer Mk V**. Few, if any such combinations were made as it was obvious that the M1 carriage was capable of carrying more than the original conversion. Thus a much longer 7.2-in barrel was placed on the M1 carriage and this was the **7.2-in Howitzer Mk 6**. The longer barrel produced a considerable range increase to 17985 m (19,667 yards) and the carriage was much more stable than the old 203-mm carriage. As more M1 carriages became available they were used to mount the new Mk 6 barrels, and by the end of 1944 there were few of the original 8-in carriages left. With the increased stability came increased accuracy, and the Mk 6 howitzer gained an enviable reputation for good shooting, to the extent that they were retained for many years after the end of the war in 1945.



The 7.2-in howitzer could be as terrifying to its crew as to the target; seen here in action at Routot, France, in September 1944 the 10-ton gun leaps into the air after firing at full charge. Surprisingly for such a makeshift design, the 7.2-in proved fairly efficient.

Specification

7.2-in Howitzer Mks I-V
Calibre: 183 mm (7.2 in)
Length of piece: 4.343 m (14 ft 3 in)
Weight: in action 10387 kg (22,900 lb)
Elevation: 0° to +45°
Traverse: 8°
Muzzle velocity: 518 m (1,700 ft) per second
Maximum range: 15453 m (16,900 yards)
Shell weight: 91.6 kg (202 lb)

Specification

7.2-in Howitzer Mk 6
Calibre: 183 mm (7.2 in)
Length of piece: 6.30 m (20 ft 8 in)
Weight: in action 13209 kg (29,120 lb)
Elevation: −2° to +65°
Traverse: 60°
Muzzle velocity: 497 m (1,630 ft) per second
Maximum range: 17984 m (19,667 yards)
Shell weight: 91.6 kg (202 lb)

USA

155-mm Gun M1

When the United States entered World War I in 1917 it was ill-equipped with heavy artillery, and consequently was issued with various Allied artillery models, including the French 155-mm (6.1-in) GPF (Grand Puissance Filloux). This gun was one of the best of its type at that time, but in the years after 1918 the American design teams sought to improve the overall efficiency of the gun and carriage by introducing a series of prototypes throughout the 1920s. Sometimes this programme stood in abeyance for years, but by the late 1930s the new design (very basically the original GPF barrel equipped to accommodate an Asbury breech mechanism) was standardized as the **155-mm Gun M1 on Carriage M1**, and production started at a steady pace at various American arsenals.

The M1 gun and carriage combination was very much an overall improvement on the old French GPF design, but introduced some new features. The barrel was 45 calibres long, and the carriage was of a heavy split-trail type carried on four double-tyred road wheels forward. This carriage arrangement was such that in action the wheels were lifted to allow the carriage to rest on a forward firing platform that in use proved to be an excellent arrangement and very stable. This stability made the gun very accurate, and eventually the carriage was adopted by the British for use with their 7.2-in (183-mm) howitzer. For towing the trail legs were hitched up on to a limber device. There were two of these, the M2 and the M5, the latter having a rapid up-and-over lift arrangement that permitted quick use in action but which could also be dangerous to an untrained crew. For this reason the M2 limber was often preferred.

The M1 was gradually developed into an **M1A1** form and then into the **M2** in late 1944. These changes were mainly limited to production expedients and did not affect the gun's performance, which proved to be excellent: a 43.1-kg (95-lb) shell could be fired to a range of 23221 m (25,395 yards). The M1 soon became one of the standard heavy guns of the US Army and was often used for counter-battery work. Numbers were issued to various allied nations, and the M1 was soon part of the British army gun park, which used the type in action in Europe from the Normandy landings onwards. The M1 also went self-propelled. This was carried out using a much-modified M4A3E8 Sherman tank chassis with the gun mounted in an open superstructure, and in this form the vehicle/gun combination was known as the M40. It was 1945 before the M40 actually got into production so its main career was post-war but it was widely used by many nations, again including the UK.

After 1945 the US Army underwent a period of internal reorganization and in the process the M1 and M2 guns became the **M59**. The post-war period also saw the end of the limber devices for it was discovered that with most of the heavy tractors used to pull the guns all that was needed was to join the trails and connect them direct to the tractor towing eye, usually with chains. In this form the 155-mm (6.1-in) M59 serves on to this day with many armies around the world. It is still a good gun, although now considered to be rather lacking in range and range flexibility as a result of the fixed charges used, and it is gradually being replaced by more modern designs. But it will still be some years before it is replaced in the armies of nations such as Austria, South Korea, Taiwan and Turkey.

Specification

155-mm Gun M1A1
Calibre: 155 mm (6.1 in)
Length of piece: 7.366 m (24 ft 2 in)
Weight: travelling 13880 kg (30,600 lb) and in action 12600 kg (27,778 lb)
Elevation: −2° to +65°
Traverse: 60°
Muzzle velocity: 853 m (2,800 ft) per second
Maximum range: 23221 m (25,395 yards)
Shell weight: 42 kg (92.6 lb)

The 155-mm Guns at War

At the end of the Civil War in 1865 the most experienced artillerymen in the world were American, but heavy guns were of little use in the years of Indian-hunting that followed. When the USA entered World War I it came as a rude shock to have to buy their equipment from the Allies, so the US Army set about designing its own artillery; the result was 'Long Tom'.

For the US Army the 155-mm (6.1-in) Gun M1 was a long time a-coming. It could trace its origins to 1919 when the Westervelt Board ('the Caliber Board') had completed its far-seeing deliberations and recommended (among other things) that the US Army should have a new and powerful 155-mm gun to follow on from the 155-mm M1918 that was already in service.

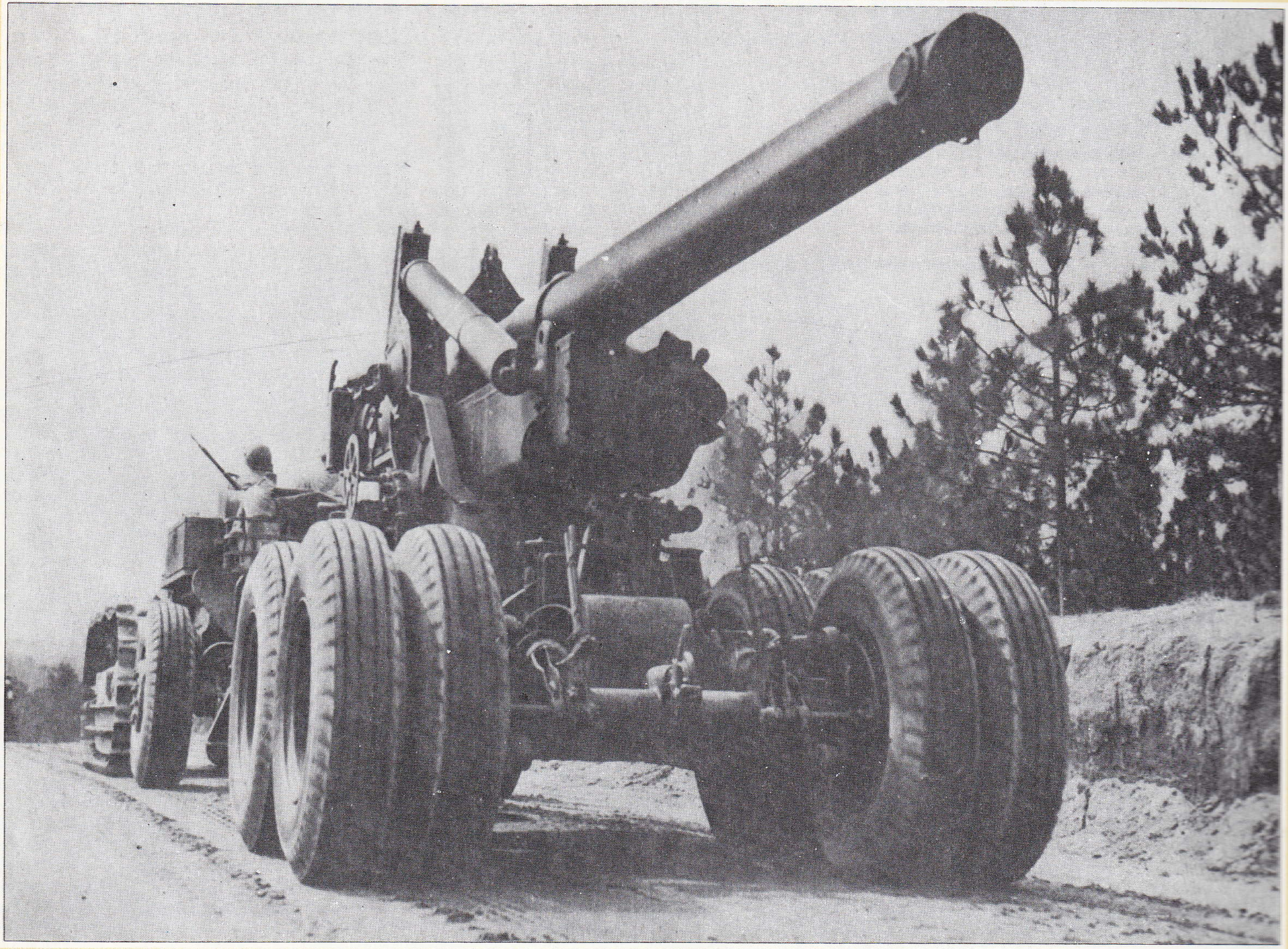
The M1918 was a good gun but for the Americans it had one fatal flaw, namely that it was not an American weapon. It was French in origin and its acceptance was something that the US Army did not like to think about. For years it had carried out a policy of purchasing American weapons only in order to maintain a state of self-reliance in case of emergencies, and any weapon or item of equipment that was purchased from abroad had to be really good or urgently required to get past the procurement authorities. While this policy was no doubt laudable from the US point of view, it did have the major disadvantage that the US armed forces became rather isolated from what was happening elsewhere in the weapon development world, and so tended to judge future requirements by its own insular experiences. Up to 1914 this meant a series of Indian wars and a few colonial expeditions. These activities did not require heavy artillery, so the US Army did not call for the development of any such weapons.

This was to have serious results in 1917 when the Americans entered World War I. The first US Army divisions to travel to the battlefields of France were almost entirely infantry-based. Their artillery component was minimal and American industry was in no position to start massive artillery production for some time. The only thing to do was to adopt whatever weapons the British and French allies could offer. At the time this extended down to machine-guns, but at the upper end it involved the adoption of French artillery pieces on a grand scale. The Americans took over from the French numbers of the famous '75', the 75-mm (2.95-in) Model 1897 field gun and also the 155-mm GPF long-range gun.

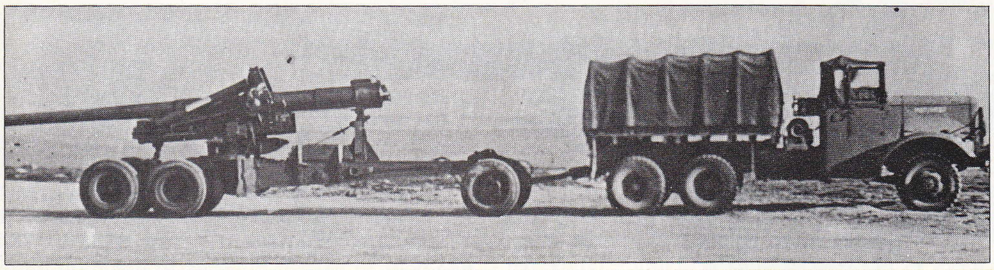
The GPF (Grand Puissance Filloux, literally 'great strength Filloux', the Filloux part relating to the name of the designer) was at the time rightly regarded as being one of the finest examples of heavy artillery in its calibre: it could fire a 43.1-kg (95-lb) high explosive shell to a range of 18380 m (20,100 yards) and yet it remained a relatively portable weapon that was easy to handle in battle. It made an ideal counterbattery weapon and was equally ideal for long-range heavy fire-support fire missions. The US Army took to it with a will, and it was even decided to produce the type in the USA.

The 155-mm guns the Americans took over from the French became known as the M1917. The home-produced versions became the M1918 and differed in detail from the French originals due to changes made to suit American production methods; there was even an M1918A1 with additional modifications. Few of these American M1918 guns reached France before the Armistice of November 1918, but the large numbers that were produced formed the

An imposing weapon even when on the move, the 'Long Tom' was a development of the excellent French 155-mm GPF gun supplied to the US Army in 1918. The heavy split-trail carriage provided a very stable firing platform.

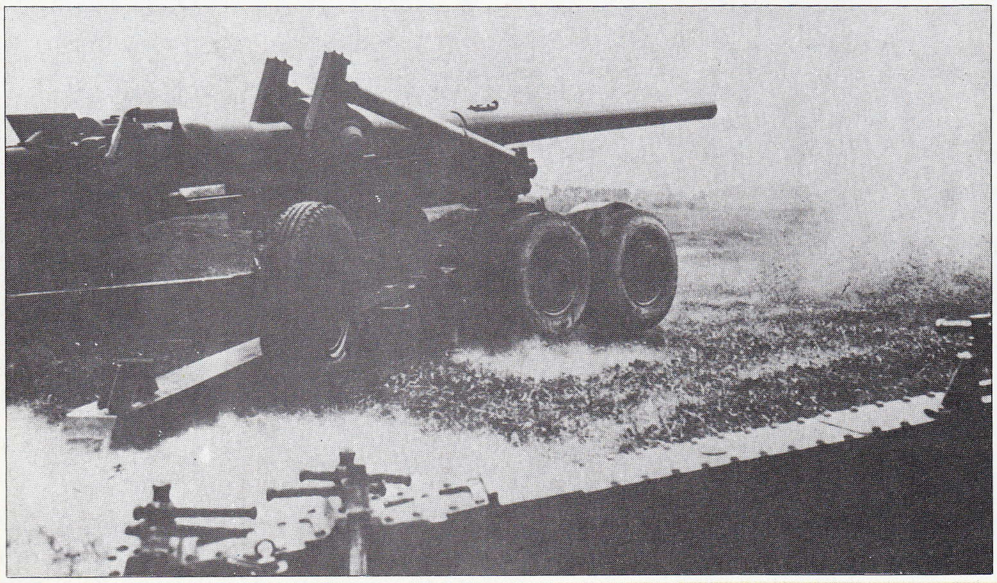


The 155-mm Guns at War



Designed to the specification of the Westervelt Board, the carriage of the 155-mm M1 was required to accept an 8-in howitzer and was finally standardized in 1938, also under the designation M1. On operations the gun was normally towed by the M4 tractor rather than the truck shown here.

The difference between gun and howitzer is seen by comparing this photograph of the US 155-mm howitzer with the picture below. 'Long Tom's' 40-calibre length barrel helped give a range of 22000 m (24059 yards) compared to the 14000 m (15311 yard) range of the stubby-barrelled howitzer.



A 'Long Tom' fires at minimum elevation, the front of the weapon resting on a firing jack underneath the carriage with the bogie raised above the ground. When it is time to move off the barrel will be pulled back and clamped to the trail.

nucleus of the US Army's heavy artillery for many years after the war. They even found a new role as coastal defence guns. The US Army was responsible for the coastal defences of the United States, but despite huge investment in batteries and weapons there were inevitably gaps around the long coastlines where no defences could be permanently sited. The M1918 was accordingly assigned to this task, being allotted to units that were intended to move along pre-determined lengths of coastline where no conventional coastal defence batteries existed. At points along these 'beats' were prepared concrete emplacements known as 'Panama Mounts' on to which the guns could be placed to provide them with a 360° field of fire. In this way the guns were used for coastal defence, and this practice remained in use until 1941 and after. Some guns actually saw action in the Philippines during the Japanese invasion.

Coastal defence

But good as the M1918 was, the Westervelt Board wanted something better. It issued an outline requirement and in 1920 a new design appeared. This was known as the M1920, but it remained only a prototype. It had a range exceeding that of the M1918 but it arrived on the scene at a point in time when the United States was avidly withdrawing into an isolationist shell and defence spending for overseas ventures was cut drastically. There were enough weapons already to hand so it seemed senseless to ask for more. Thus spending on the 155-mm (6.1-in) gun project was slashed to the point where the design remained in limbo for many years. At the end of the 1920s some efforts were made to produce a modern form of carriage for a 155-mm gun. Shortly after a new gun design was initiated that was intended to be even more powerful than the M1920, but again funding was hard to come by so development dragged on throughout the 1930s. The new gun was designated the T4 and underwent some modifications before it was at last ordered for production during 1938 as the 155-mm Gun M1 on Carriage M1.

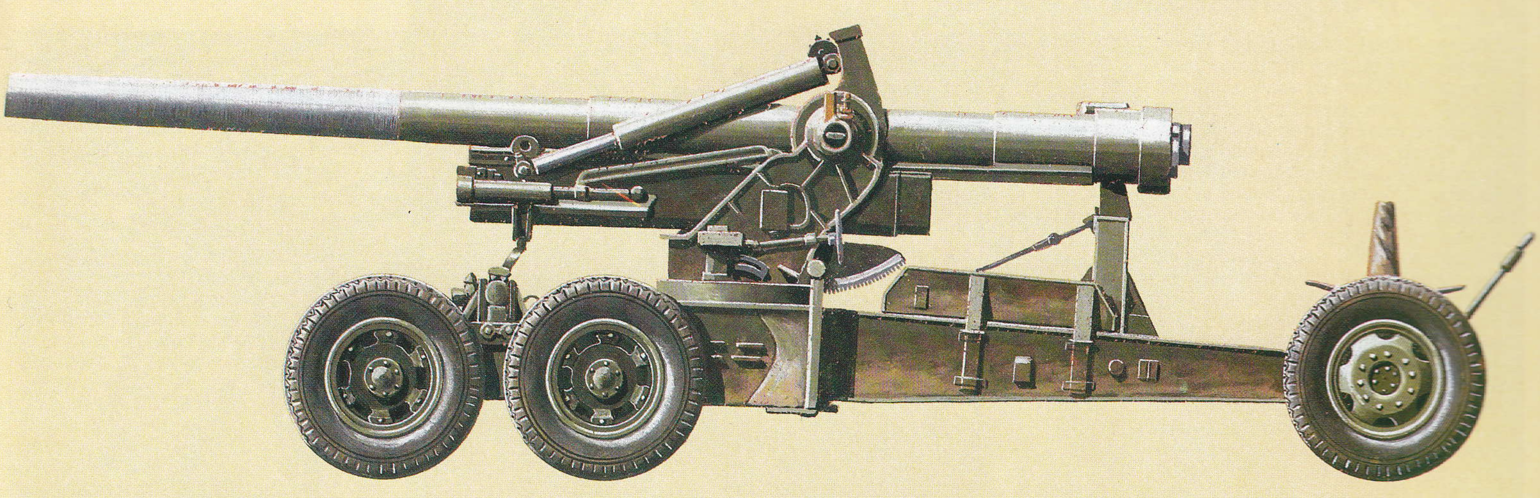
At first production proceeded at a slow pace at the Watervliet Arsenal. By the time of Pearl Harbor only about 65 complete equipments had been produced, but things then altered drastically. Once again the US Army was plunged into war with a deficiency of heavy artillery, but this time some equipments were to hand and so were the facilities for making more. As an interim measure during the 1930s many M1918 gun carriages had been 'high-speeded' for faster traction by the introduction of new wheel bearings and pneumatic tyres and brakes, so these at least could provide the US Army with a start towards its war preparations, and it had a lot of preparing to do. As the United States entered the war huge numbers of raw recruits flocked to the training establishments that sprang up all over the continental USA. They at least had something with which to train: in June 1940 the US Army had no less than 973 155-mm guns of all types and more were to hand by the following year. Many of these were located in such places as the Philippines, Panama and other overseas stations, and some were lost during the Japanese invasion of some of the Far East outposts.

'Long Tom'

Thus the M1918 entered a new war, but as time went on the type was gradually replaced by the more modern 155-mm Gun M1 and its modern stable carriage. But the M1918s took a long time to fade away. Many were retained as training weapons until the war ended and it was the winter of 1943-4 before the last of them were withdrawn from active service in Italy. The barrels were still good for more service but the carriages were not, being quite simply too worn and battered for more use as their age caught up with them.

By that time the Gun M1 was well established and coming off the production lines in ever-growing numbers. But this growth was not without its critics. Many high-ranking officers within the US Army hierarchy took a long time to be persuaded that heavy artillery was required in quantity, and that included the 155-mm guns. The critics adopted the line that valuable shipping space could be better used by weapons such as anti-tank and anti-aircraft weapons, and that there would be little call for heavy artillery in the type of fast-moving combat they envisaged for the US Army once it got back into Europe. The troops in the batteries thought otherwise, but it took some time for production priorities to be rearranged and the really large increase in numbers did not take place until 1943; hence the survival of the M1918 as a front-line weapon until 1944. But even after that date there were temporary changes in priorities that meant that M1 production was slowed.

It was all rather frustrating for the heavy artillery battery commanders, who wanted more and more of the new guns. Once with the troops the M1 proved to be an immediate success and the weapon soon was assigned the nickname 'Long Tom'. This name was well deserved, for the M1 had a long slender barrel 45 calibres long (L/45) that gave the gun a distinctive appearance. The gunners were less happy with the carriage, for although it provided the



The 155-mm M1 gun in travelling mode, trails together and connected to the limber. Still used by 13 countries today, it is served by a 14-strong crew and can maintain a rate of fire of two rounds per minute.

barrel with a very stable firing platform it was something of a brute to move. Fortunately the split trail legs provided the top carriage with a wide degree of traverse; no less than 30° could be traversed to each side of central. Thus small changes of firing angle did not require the usual humpings and heavings, but moves of any distance did. These were made no easier by the carry-over from the M1918 of a single-axle limber device that took the weight of the trail legs off the towing vehicle, but the lifting of the trail legs onto the limber was no easy task. This was realized by the designers, who revised the original limber design (the M2) into a form where the limber itself could be used to lift the trail legs by an 'up-and-over' mechanism involving cables. While this device (the M5) worked, it was soon discovered that its action was very unforgiving to anyone who got in the way while the device was in operation. In fact it was downright dangerous and many casualties were caused before more care and attention were devoted to its use. Despite the success of such training, the M5 limber remained heartily disliked by all who had to use it and whenever possible battery commanders attempted to obtain the old M2 limber.

Gradually numbers of M1s crossed the Atlantic and moved into action in Italy. In the UK the type was prepared for the invasion of France, but back in the United States the M1s were already 'on active service'. Like the earlier M1918 the M1 also assumed a coastal-defence role and was used as part of a four-weapon defence system to cover the coasts of the mainland USA. Largest of the four types of weapon involved were the 406-mm (16-in) coastal-defence guns that could shield large areas of coastline. Behind them were 152-mm (6-in) coast-defence guns and numbers of 90-mm (3.54-in) guns in turrets. Finally the M1s were intended to cover the gaps in the coverage of the static weapons, and this they did using some of the old Panama Mounts but also numbers of the mobile metal 'Kelly Mounts' whose origins owed much to the basically similar mounts used by the German 15-cm Kanone 39.

After the middle of 1944 the M1 was to be found in service everywhere from the Pacific to Germany. They at all times provided sterling service and were also used by the Royal Artillery long-range batteries of the British army and for a time by the Free French forces. They proved themselves excellent weapons, and many are still in use to this day.

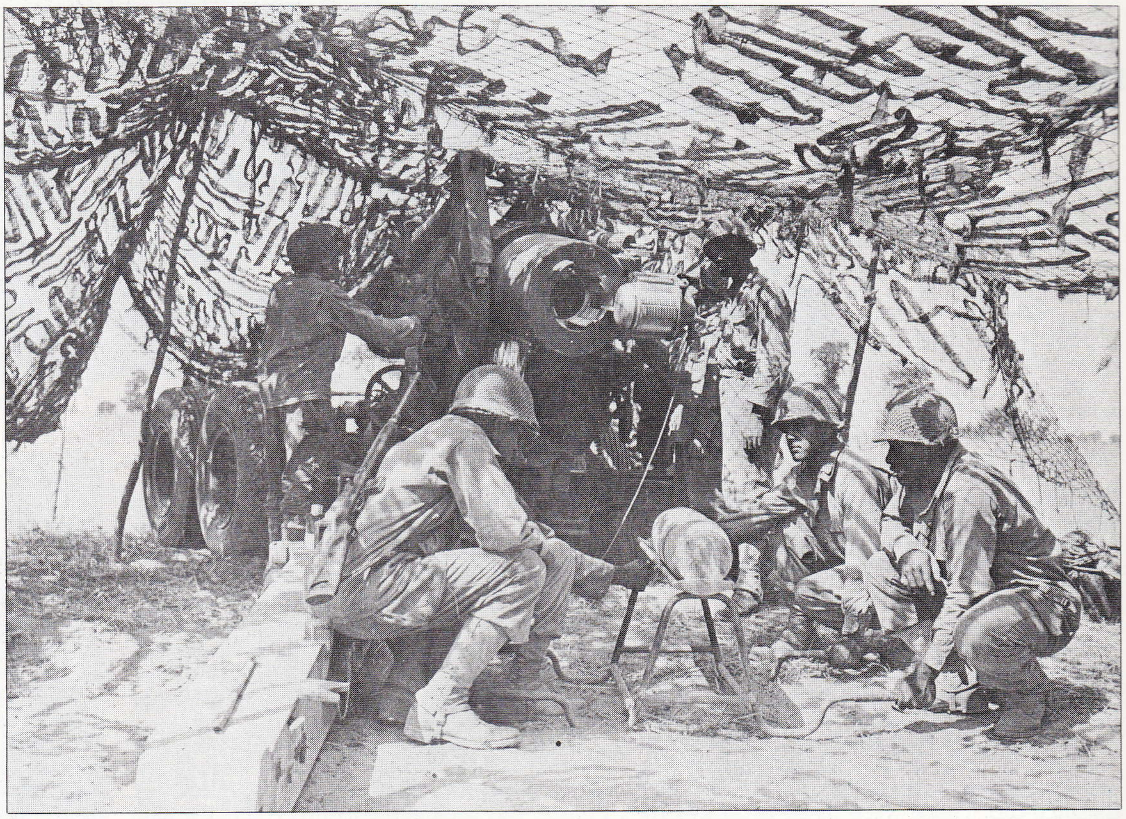
The gunner covers his ears as his 155-mm 'Long Tom' blasts off a round against Japanese artillery positions in the hills beyond Dulag, Leyte Island, 1944. The long range of the 155-mm made it an excellent weapon for counterbattery work.

USA

8-in Howitzer M1

After the United States entered World War I in 1917, among the various types of heavy artillery its army received once US troops arrived in France was the British 8-in Howitzer Mks VII and VIII, which were incidentally being produced in the United States to a British order. The Americans took to this howitzer with a will, for they soon discovered that it was a very accurate weapon and in the years after 1918 set about producing their own version. This was under the aegis of an advisory body known as the Westervelt Board, which also recommended the introduction of the 155-mm Gun M1. The board also recommended that the 155-mm (6.1-in) gun and the 203-mm (8-in) howitzer should share the same carriage and thus the new howitzer used the same M1 carriage as the 155-mm Gun M1.

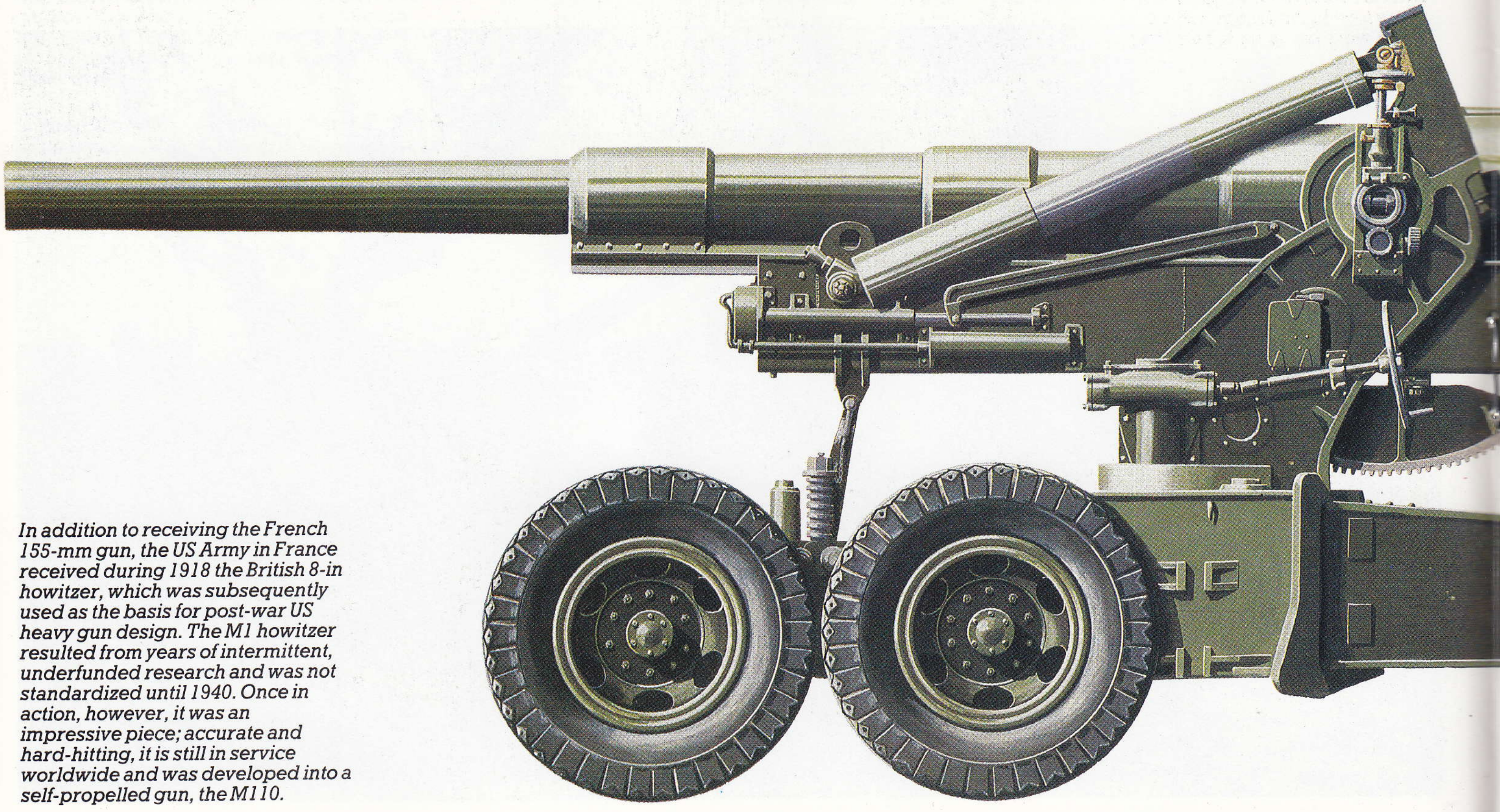
Despite the recommendations of the Westervelt Board, however, the development of the new howitzer was slow and erratic, and at times ceased altogether for years on end. Thus it was not until 1940 that the howitzer was standardized as the **8-in Howitzer M1**. The M1 owed much to its British origins but was longer, and as it used the M1 carriage it was even more accurate than its predecessor. However, it should not be thought that because the 8-in Howitzer M1 and the 155-mm Gun M1 shared the same carriage the two barrels were interchangeable. They were not, for to exchange the two barrels involved a great deal of workshop time and a great deal of trouble.



Above: A good view of the interrupted-screw stepped-thread breech mechanism of an 8-in howitzer in action. Four crew members prepare to lift the 91-kg (200-lb) shell, the size of which gives some clue as to why the maximum rate of fire was one round per minute.

Once the Howitzer M1 had been introduced into service it soon became a very popular and powerful weapon. Because of its accuracy it could be used to bring down heavy fire on spot targets quite close to friendly troops and was frequently used thus in the elimination of enemy strongpoints and bunkers. The shell fired by the M1 was initially a 90.7-kg (200-lb) high explosive shell also used by 203-mm (8-in) coast guns, but this was later replaced by a special high explosive shell known as the M106 which had the same weight as the earlier shell but which could be fired to a range of 16596 m (18,150 yards). The M106 is still in service with the 8-in Howitzer M1, which in a post-war designation reshuffle was redesignated **M115**.

Like the 155-mm Gun M1 the 203-mm howitzer also went self-propelled, although the first version did not



In addition to receiving the French 155-mm gun, the US Army in France received during 1918 the British 8-in howitzer, which was subsequently used as the basis for post-war US heavy gun design. The M1 howitzer resulted from years of intermittent, underfunded research and was not standardized until 1940. Once in action, however, it was an impressive piece; accurate and hard-hitting, it is still in service worldwide and was developed into a self-propelled gun, the M110.

8-in Howitzer M1 (continued)

The blast effect of an 8-in howitzer hits not just the ears but the whole body as the shock wave passes outwards. This is the first 8-in howitzer in action in Normandy, 1944, firing during the barrage the Americans organized to celebrate the Fourth of July.

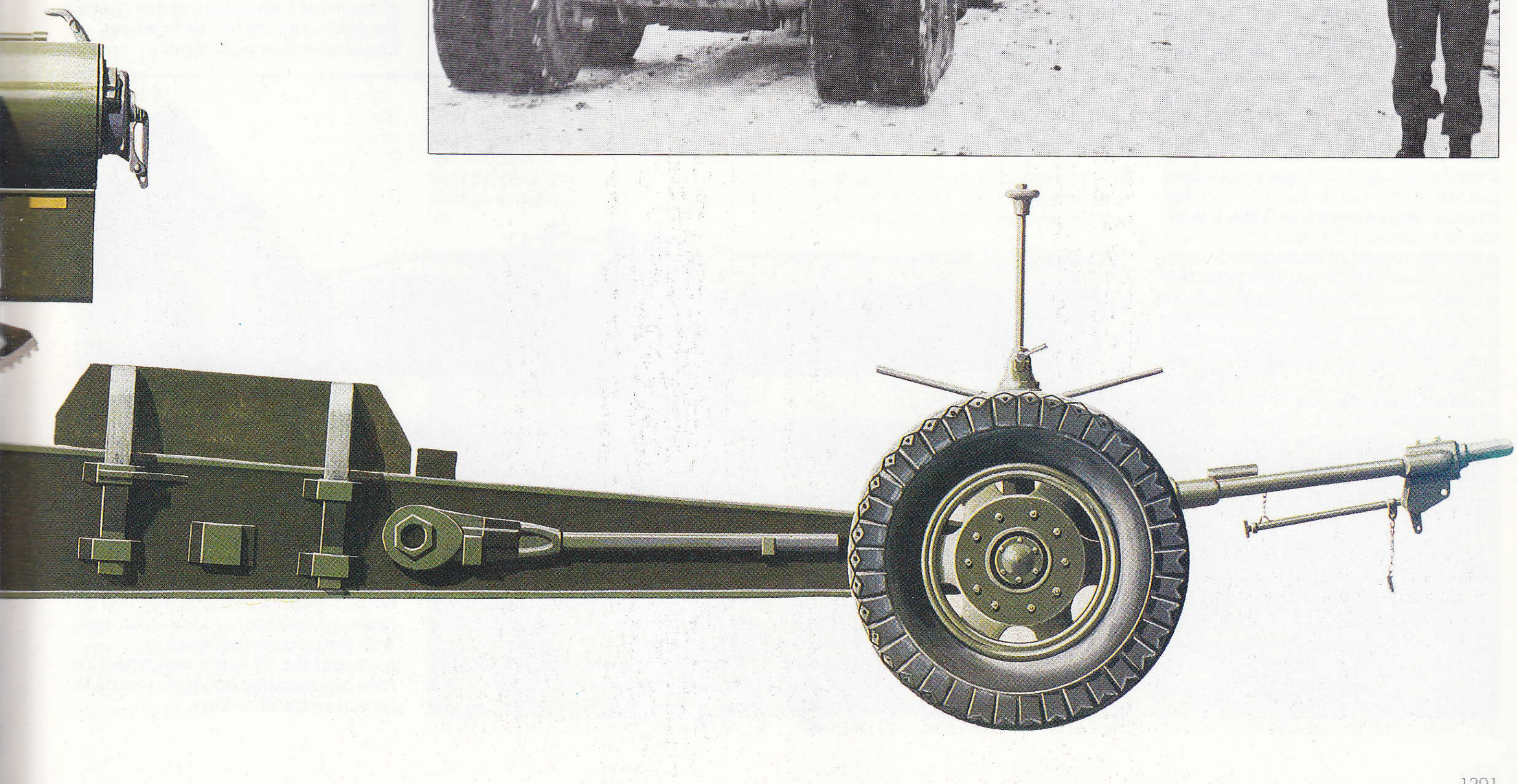
appear until 1946. This was the M46 which used a much-modified M25 tank chassis as the carrier. Subsequent development along these lines has now led to the M110 series which originally used the 203-mm howitzer in a form virtually unchanged from its towed version but which has now been developed to the M110A2 which uses a much lengthened 203-mm howitzer barrel.

The towed 8-in Howitzer M115 is still in widespread service all over the world, and there are few signs that it is likely to be replaced in the near future. Thus the 203-mm howitzer can lay claim to being one of the longest-lived of all modern heavy artillery pieces: it can trace back its origins to World War I and is still in service.

Specification

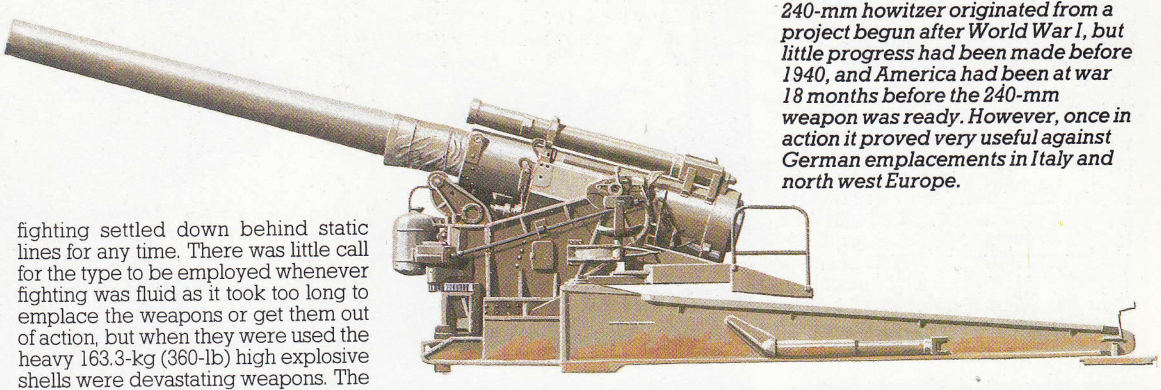
8-in Howitzer M1
Calibre: 203 mm (8 in)
Length of piece: 5.324 m (17 ft 5.59 in)
Weight: travelling 14515 kg (32,000 lb) and in action 13471 kg (29,698 lb)
Elevation: −2° to +65°
Traverse: 60°
Muzzle velocity: 594 m (1,950 ft) per second
Maximum range: 16596 m (18,150 yards)
Shell weight: 90.7 kg (200 lb)

Right: Driving through the bitter December weather of 1944, these 8-in howitzers are travelling through Belgium to join the US First Army. Artillery was particularly effective in areas like the Ardennes, where roads were few and choke points obvious.



USA

240-mm Howitzer M1



Weighing over 30 tons, the US 240-mm howitzer originated from a project begun after World War I, but little progress had been made before 1940, and America had been at war 18 months before the 240-mm weapon was ready. However, once in action it proved very useful against German emplacements in Italy and north west Europe.

The Westervelt Board of 1919 made many recommendations as to the future state of American artillery, too many in fact for the military funds available at the time. Thus some parts of the re-equipment programme had to be postponed following some preliminary design investigations that lasted until 1921. One part of these postponed projects concerned a common carriage that could mount either a 203-mm (8in) gun or a 240-mm (9.45-in) howitzer. At that time the 240-mm howitzer project could be dropped because the US Army was still trying to develop a 240-mm howitzer based on a French Schneider design, but that project was beset with problems and eventually came to nothing, only a few equipments being produced for training purposes.

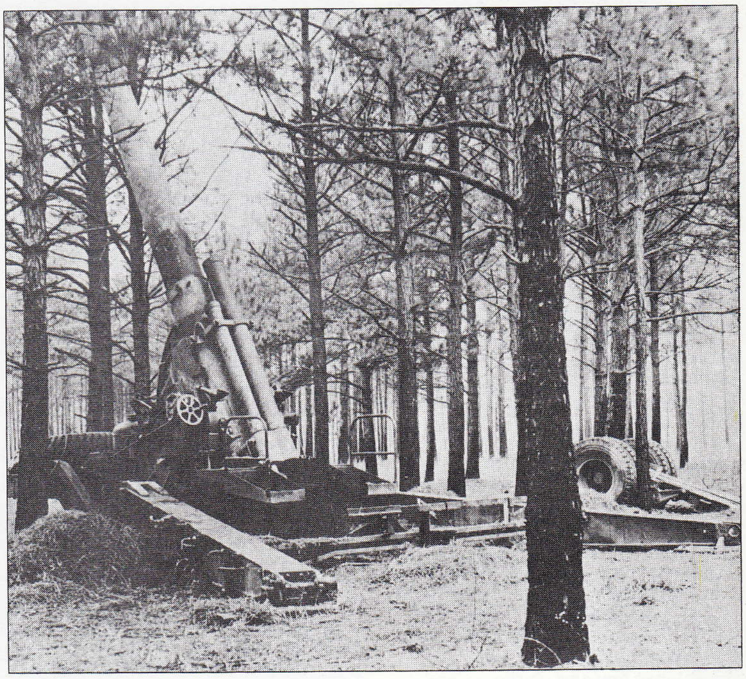
But in 1939 things looked different, and the 203-mm gun/240-mm howitzer project was resurrected. The 203-mm gun took far longer to get into service than was at first envisaged, and it was not until 1944 that the first equipments were issued. But the 240-mm howitzer project was less problematical and was ready by May 1943. This **240-mm Howitzer M1** turned out to be a fairly massive piece of artillery using what was virtually an enlarged M1 carriage as used on the 155-mm (6.1-in) Gun M1. But the 240-mm howitzer carriage did not travel with the barrel fitted. Instead it travelled on a six-wheeled carriage and once on site its wheels were removed. The barrel was towed on a form of semi-trailer. At the chosen site the carriage had to be carefully emplaced and a pit was dug to permit barrel recoil at full 65° elevation. The barrel was then lifted into position, usually by a mobile crane that was also used to place the carriage into position and spread the trails. Emplacement of the 240-mm howitzer was thus no easy task, and sometimes took up to eight hours of arduous labour.

But once in place the howitzer proved to be a powerful weapon. It was first used extensively during the Italian campaign and afterwards in North West Europe whenever the fighting settled down behind static lines for any time. There was little call for the type to be employed whenever fighting was fluid as it took too long to emplace the weapons or get them out of action, but when they were used the heavy 163.3-kg (360-lb) high explosive shells were devastating weapons. The 240-mm howitzers were used by both the US and British armies, and they served on for many years after the war. A few attempts were made to place the 240-mm howitzer onto some form of self-propelled chassis but none of these projects got very far despite the advantages that self-propulsion would have given this heavy weapon. Instead attempts were made to simplify the assembly procedure or even allow the piece to travel in one load. Nothing came of these ideas and the 240-mm howitzer was gradually withdrawn from use during the late 1950s.

Today the only 240-mm Howitzer M1s still in use are those emplaced on the Chinese Nationalist-held islands off the coast of mainland China. There they act as heavy coast-defence weapons and are kept fully serviceable.

Specification

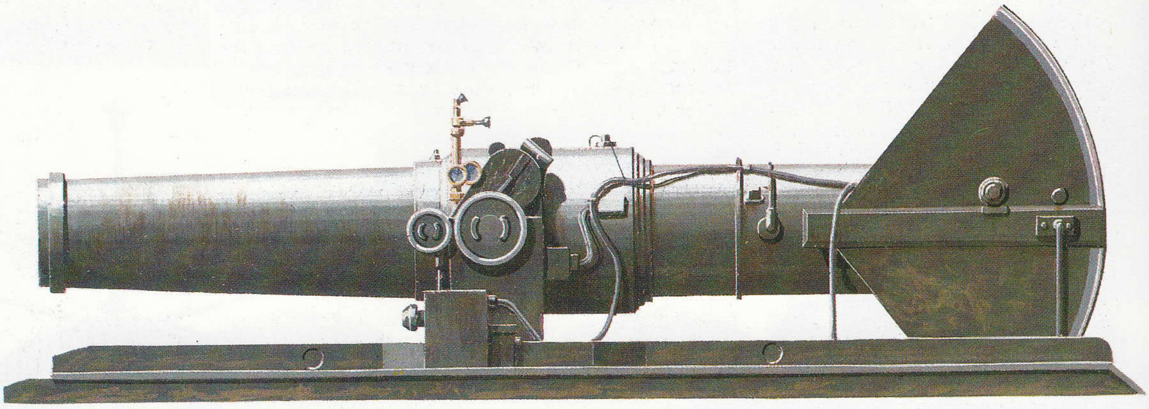
240-mm Howitzer M1
Calibre: 240 mm (9.45 in)
Length of piece: 8.407 m (27 ft 7 in)
Weight: complete 29268 kg (64,525 lb)
Elevation: +15° to +65°
Traverse: 45°
Muzzle velocity: 701 m (2,300 ft) per second
Maximum range: 23093 m (25,255 yards)
Shell weight: 163.3 kg (360 lb)



A 240-mm howitzer prepared for action: it travelled on a six-wheel carriage, which was emplaced over a pit dug to absorb the recoil. The barrel was then lifted into place by a crane which was also used to spread the trails. Setting up the howitzer could take over eight hours.

USA

'Little David'



The largest-calibre artillery piece of modern times, 'Little David' was originally a device for testing aircraft bombs by firing them at various targets. Someone suggested that it could be used as a gun proper, and with the invasion of Japan in prospect the US Army welcomed the idea of a monster howitzer to smash Japanese fortifications.

Despite the fact that many artilllery pieces were much larger than the strange device known as **'Little David'**, the fact remains that this weapon still holds the record of having the largest calibre of any modern artillery piece at no less than 914 mm (36 in), and not even the largest German railway gun, the huge 80-cm K(E), got anywhere near that with its calibre of 800 mm (31.5 in).

Little David was one of the oddities of the artillery world. It had its origins in a device used to test aircraft bombs by firing them from converted large-calibre howitzers at chosen targets. Existing howitzers could not manage to fire the heavier bombs so a device known as the **Bomb Testing Device T1** was designed and produced. It performed well enough and gave somebody the idea of using the device as an artillery weapon proper. With the invasion of the mainland of Japan in prospect such a weapon would be ideal for demolishing the expected Japanese bunkers and strongpoints, so the project was given the go-ahead in March 1944 and firing tests started later the same year.

Little David was little more than a large muzzle-loaded mortar with a rifled barrel. The barrel rested in a steel box buried in a deep pit which also contained the elevating gear and the six hydraulic jacks used to mount and remove the barrel. Some traverse was provided in the box mounting and the barrel was elevated and depressed using a geared quadrant on the breech end of the barrel. There was no recuperator mechanism, the barrel being simply pumped back into position after each firing. Loading was by a special crane which formed part of Little David's equipment train.

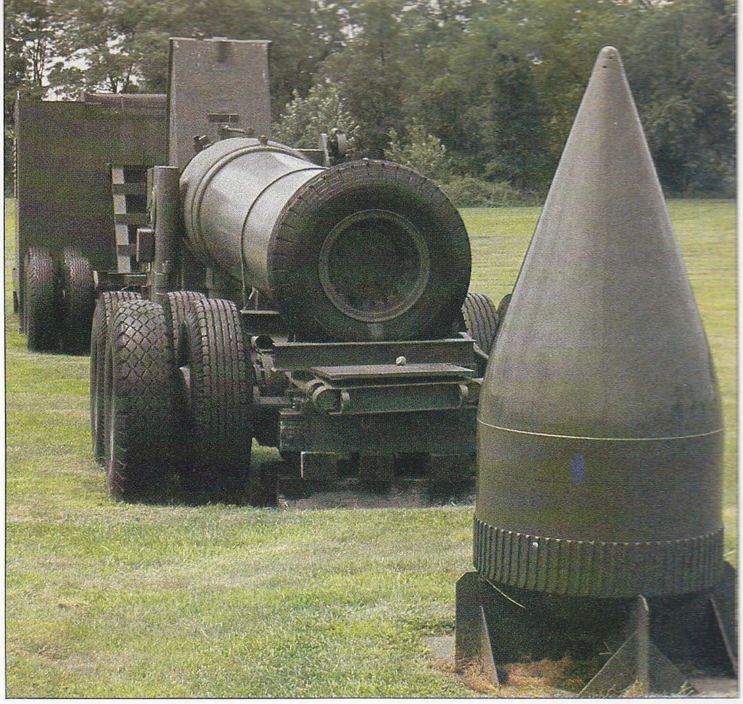
The projectile was of a unique form with a long tapered nose and a curved base. It weighed no less than 1678 kg (3,700 lb), of which 726 kg (1,600 lb)

'Little David' (continued)

was explosive. Such a projectile would have had dreadful effects on any target, but Little David was never used in action. During its firing trials it was soon demonstrated that accuracy was poor, and the US Army was less than enchanted by the 12-hour emplacement time required every time the weapon was used. The war ended before the development trials were complete and the US Army promptly put the whole project 'on ice' before finally cancelling it during late 1946. Thus Little David never even left the Aberdeen Proving Grounds in Maryland where all its development and firing trials had been conducted, and the weapon promptly became a museum piece for the wonderment of all. Today it can still be seen there, forming part of the extensive ordnance museum that occupies much of the site open to the public. The weapon is still relatively complete. What appears to be a small metal shed is in fact the main mounting which was supposed to be dug into a pit. The barrel rests on its transporter wheels ready to be towed in semi-trailer fashion by a heavy tractor, and one of the oddly-shaped shells is still to hand.

Specification

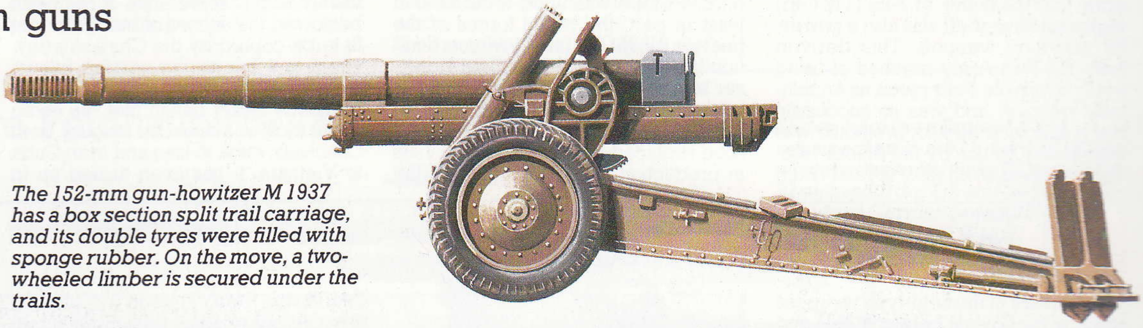
Little David
Calibre: 914 mm (36 in)
Length of piece: with elevating arc 8.534 m (28 ft 0 in)
Weight complete: 82808 kg (182,560 lb)
Elevation: +45° to +65°
Traverse: 26°
Muzzle velocity: not recorded
Maximum range: 8687 m (9,500 yards)
Shell weight: 1678 kg (3,700 lb)



Once the atomic bomb had saved the Allies from mounting a conventional invasion of Japan the fortress-crusher 'Little David' was without a role and the project cancelled.

USSR

Soviet 152-mm guns



The 152-mm gun-howitzer M 1937 has a box section split trail carriage, and its double tyres were filled with sponge rubber. On the move, a two-wheeled limber is secured under the trails.

When considering Soviet artillery development it is as well to remember that the Soviet artillery design teams rarely produced anything innovative. Instead they placed great emphasis upon a steady programme of development in which a new piece of ordnance was placed on an existing carriage, or in which a new carriage was allied to an existing gun or howitzer. Their continual aim was to produce an artillery piece that was as light as possible but firing as heavy a projectile as possible to as great a range as possible.

This was particularly true of the Soviet 152-mm (6-in) heavy guns. There were three main types of these, although others existed and the earliest of them could trace its origins back to 1910. Despite its age this weapon, designated the **152-mm Pushka obr. 1910g** was updated in 1930 to become the **152-mm Field Gun Model 1910/30**. In this form it was still in service when the Germans invaded in 1941. The Model 1910/30 was an unremarkable piece of artillery, so heavy that it had to be carried in two loads. This was considered to be too much of a disadvantage for modern use, and by 1941 the Model 1910/30 was being phased out of use. The Germans designated captured equipments **15.2-cm K 438(r)**.

In 1937 the Soviet design teams came up with a replacement. This was the **152-mm Gaubitsa-Pushka obr. 1937g (152-mm Gun-Howitzer Model 1937)** which emerged as a new and rather long gun barrel mounted on the carriage of an existing piece, the 122-mm (4.8-in) Field Gun Model 1931/37 (A-19). This combination was a gun-howitzer rather than a gun, and turned out to be a very versatile and powerful weapon, known to the Germans as the **15.2-cm K 433/1(r)** in captured service.

The Soviets wanted vast numbers, but the Artillery Plant Number 172 at Perm could not produce enough so another source of these gun-howitzers was sought. This turned out to be the same barrel as the Model 1937 but mounted on the carriage of an earlier 122-mm (4.8-in) field gun, the Model 1931. This combination was known for some reason as the **152-mm Gun-Howitzer Model 1910/34**, to the Soviets and as the **15.2-cm K 433/2(r)** to the Germans.

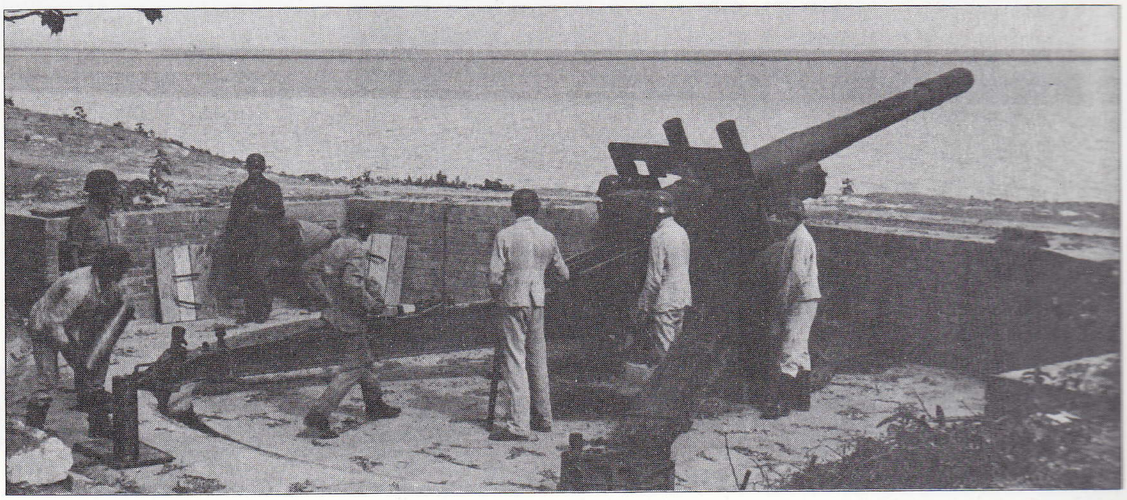
There was also one other Soviet 152-mm (6-in) field gun about which little is now known. This was apparently a long 152-mm naval barrel placed on the carriage of the 203-mm (8in) howitzers produced as a form of emergency design in 1941-2. Few details now exist.

These two major field guns designs, the Model 1937 and the Model 1910/34, formed the mainstay of the heavy field gun batteries of the Red Army throughout the war. Later development tended to concentrate on howitzers, but the field guns proved to be very useful weapons. They were often able to outrange their German counterparts and so impressed the German gunners that they used as many captured Soviet 152-mm guns as they could lay their hands on. Many of these captured weapons were used against their former owners and as many again were diverted to the Atlantic Wall defences.

Perhaps the best indication of how good the Model 1937 gun-howitzer was at the time it was introduced can be seen by the fact that it is still in widespread service to this day. Now known as the **ML-20**, it remains in service with many Soviet-influenced armies throughout the world, from Cuba to China.

Specification

Model 1937
Calibre: 152.4 mm (6 in)
Length of piece: 4.925 m (16 ft 1.9 in)
Weight: travelling 7930 kg (17,483 lb) and in action 7128 kg (15,715 lb)
Elevation: −2° to +65°
Traverse: 58°
Muzzle velocity: 655 m (2,149 ft) per second
Maximum range: 17265 m (18,880 yards)
Shell weight: 43.5 kg (95.9 lb)



Seen here in German hands as a coastal defence piece, the Soviet 152-mm gun was a tough and reliable weapon and was produced in vast numbers. Massed batteries of heavy artillery played a vital role in driving the Germans back from Moscow to Berlin.

USSR

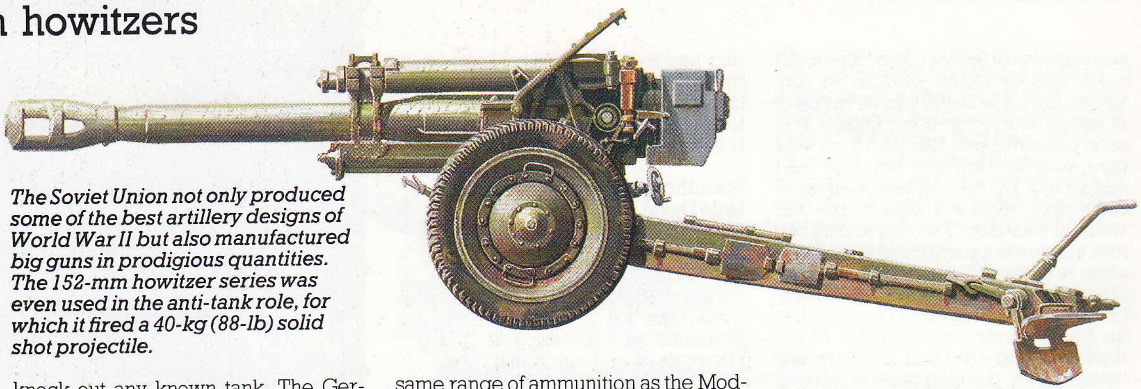
Soviet 152-mm howitzers

In 1941 the Red Army still had substantial numbers of short 152-mm (6-in) howitzers such as the **Field Howitzer Model 1909/30** and **Field Howitzer Model 1910/30**, but these were long in the tooth and despite an interim updating programme carried out after 1930 they lacked range. It was realized that these howitzers would have to be replaced and in 1938 the replacement appeared. For once this weapon was an all-new design combining a long 152-mm barrel with a sturdy and steady split-trail carriage. It went into production at two artillery factories, Artillery Plant Number 172 at Perm and Artillery Plant Number 235 at Volkinsk. The **Field Howitzer Model 1938**, later known as the **M-10**, turned out to be a great success and was widely used, later becoming one of the main types in Red Army service throughout the war.

The Red Army came to value the flexibility of the howitzer over the long-range capabilities of the gun to a great extent, and found during the early days of the war with the invading German army that the heavy 51.1-kg (112.6-lb) high explosive shell was also a powerful anti-tank weapon. This derived from the Red Army practice of using every available field piece as an anti-tank weapon, and was so successful that a special solid-shot projectile was introduced for use by the Model 1938. This weighed 40 kg (88.2 lb) and could knock out any known tank. The Germans also prized the Model 1938 highly, using as many as they could capture under the designation **15.2-cm sFH 443(r)**, either in the Soviet Union or as part of the Atlantic Wall defences. More turned up in Italy and France.

In their constant striving to make their progeny as light and efficient as possible, the Soviet artillery designers later converted the Model 1938 to be mounted on the carriage of the 122-mm (4.8 in) Model 1938 howitzer. A larger muzzle brake was fitted to reduce, at least in part, the recoil forces of the heavier barrel, and the new combination became the **152-mm Field Howitzer Model 1943**. As its designation implies this new howitzer/carriage combination was first produced in 1943 and soon replaced the earlier Model 1938 in production. It continued to fire the same range of ammunition as the Model 1938 and the range capabilities remained the same. By 1945 it was in service with the Red Army in huge numbers and was later designated the **D-1**.

Post-war the Model 1938 and Model 1943 went on to serve in many more conflicts. Gradually the Model 1938 faded from use and is now known to be used only by Romania, but the Model 1943 is still very much in evidence. It is still in Red Army service, although now mainly with reserve units. It has been bestowed the accord of being thought fit to be copied by the Chinese army, which now has its own version, known as the **Type 54**. The Model 43 is used by nearly every nation that has come under Soviet influence, ranging from Czechoslovakia to Iraq and from Cuba to Vietnam. It has even turned up in Ethiopia and Mozambique. There seems to be no sign of its ever passing away.



The Soviet Union not only produced some of the best artillery designs of World War II but also manufactured big guns in prodigious quantities. The 152-mm howitzer series was even used in the anti-tank role, for which it fired a 40-kg (88-lb) solid shot projectile.

Specification

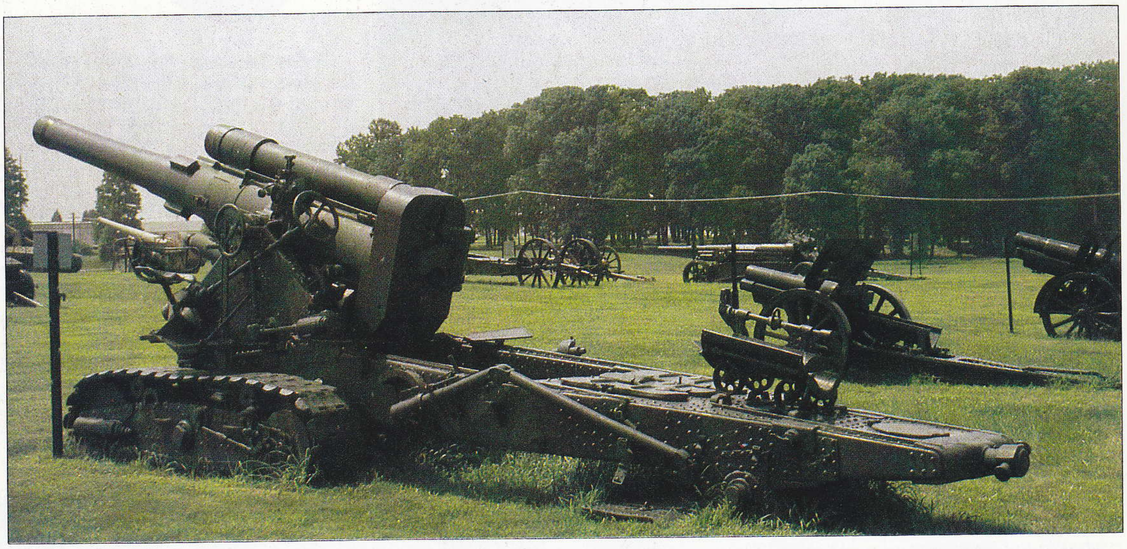
Model 1943
Calibre: 152.5 mm (6 in)
Length of piece: 4.207 m (13 ft 9.6 in)
Weight: travelling 3640 kg (8,025 lb) and in action 3600 kg (7,937 lb)
Elevation: −3° to +63.5°
Traverse: 35°
Muzzle velocity: 508 m (1,667 ft) per second
Maximum range: 12400 m (13,560 yards)
Shell weight: HE 51.1 kg (112.6 lb)

USSR

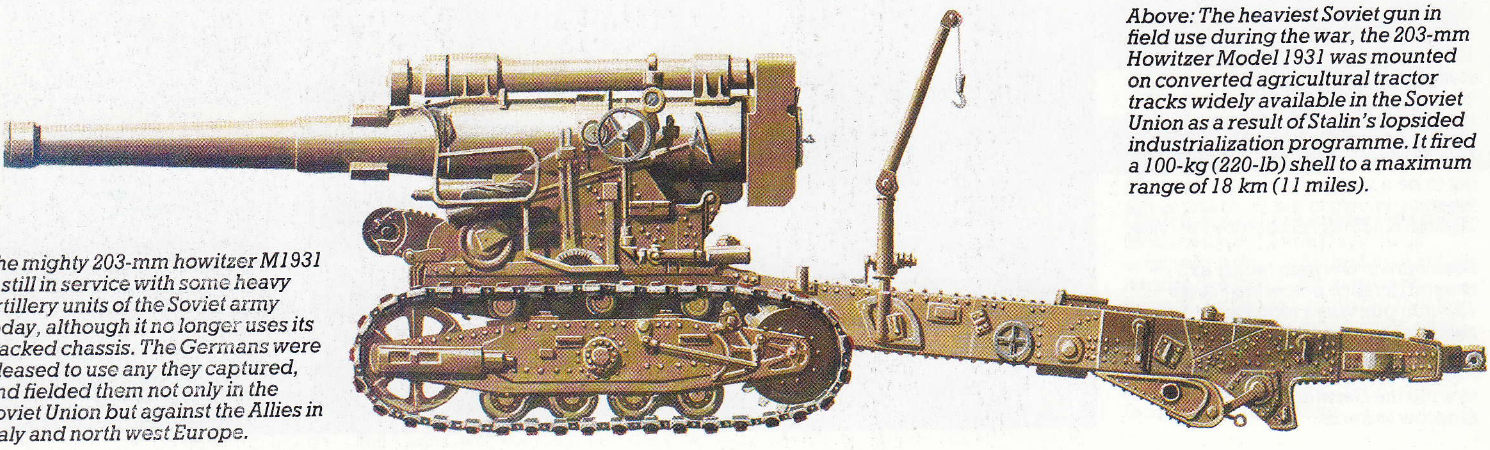
203-mm Howitzer Model 1931

The heaviest of the field-type weapons used by the Soviets between 1941 and 1945 was the **203-mm Howitzer Model 1931**, also known as the **B-4**. This was a powerful but heavy weapon that is now generally remembered as being one of the few artillery weapons to use a carriage that ran on caterpillar tracks. This was an outcome of the huge Soviet investment in tractor factories during the 1920s and 1930s, and the use of these tractor tracks was thus an obvious and economic measure for the Soviet carriage designers to take. The use of these tracks meant that the Model 1931 could traverse very bad or soft terrain where other weapons of similar weight could not venture.

This was an important point for the Model 1931, which was a heavy piece. It was so heavy that although most versions could be towed for short distances in two loads, long moves involved the breaking down of the weapon into as many as six separate



Above: The heaviest Soviet gun in field use during the war, the 203-mm Howitzer Model 1931 was mounted on converted agricultural tractor tracks widely available in the Soviet Union as a result of Stalin's lopsided industrialization programme. It fired a 100-kg (220-lb) shell to a maximum range of 18 km (11 miles).



The mighty 203-mm howitzer M1931 is still in service with some heavy artillery units of the Soviet army today, although it no longer uses its tracked chassis. The Germans were pleased to use any they captured, and fielded them not only in the Soviet Union but against the Allies in Italy and north west Europe.

loads. Some versions could move in five loads but there were about six different variants of the Model 1931. All of them used the tracked carriage but varied in the way they were towed. Movement of the Model 1931 involved the use of a limber onto which the split trails were lifted to be towed, usually by some form of heavy tracked tractor with (again) agricultural origins. Some of these limbers used tracks again but others had large single road wheels. Others had twin road wheels of smaller diameter.

To the soldier at the front all these variations made little difference as the howitzer itself remained much the same throughout its service life. It was rather a ponderous weapon to use in action, and the rate of fire was usually limited to one round every four minutes, although higher rates could be attained. It made a powerful barrage weapon but was also used for the demolition of heavy strongpoints, a heavy 100-kg (220.46-lb) high explosive shell being provided for the role. But essentially it was a weapon for static use as it was a ponderous beast, being limited on the move to a maximum speed of no more than 15 km/h (9.3 mph). Not surprisingly, whenever mobile warfare was possible the Model 1931 was at a disadvantage and consequently many fell into German hands as they could not be moved quickly enough. The Germans were so short of heavy artillery that they used as many as they could, mainly in the Soviet Union but also in Italy and in North West Europe after 1944, under the designation **20.3-cm H 503(r)**.

After 1945 the Model 1931 appeared to fade from service but in recent years it has once more emerged. It is still part of the equipment of the current Red Army heavy artillery brigades and is still used for the destruction of strongpoints and any fortresses that might still be encountered. It has now lost the tracked travelling arrangements and has in their place a new wheeled road-wheel suspension with two wheels in tandem on each side. It is now very likely that this form of carriage allows the Model 1931 to be towed in one load, and it is also believed that this veteran will be replaced in the near future by a new 203-mm (8-in) howitzer on a self-propelled carriage.

Specification

Model 1931

Calibre: 203 mm (8 in)
Length of piece: 5.087 m (16 ft 8.3 in)
Weight: in action 17700 kg (39,022 lb)
Elevation: 0° to +60°
Traverse: 8°
Muzzle velocity: 607 m (1,991 ft) per second
Maximum range: 18025 m (19,712 yards)
Shell weight: 100 kg (220.46 lb)

Its tracks provided the 203-mm howitzer with unusual short-range mobility for such a heavy gun, although for long journeys it had to be broken down into several loads. Here the 203-mm howitzer ploughs its ponderous way through the snow to a new position, towed by a Stalin artillery tractor.

GERMANY

15-cm schwere Feldhaubitze 18

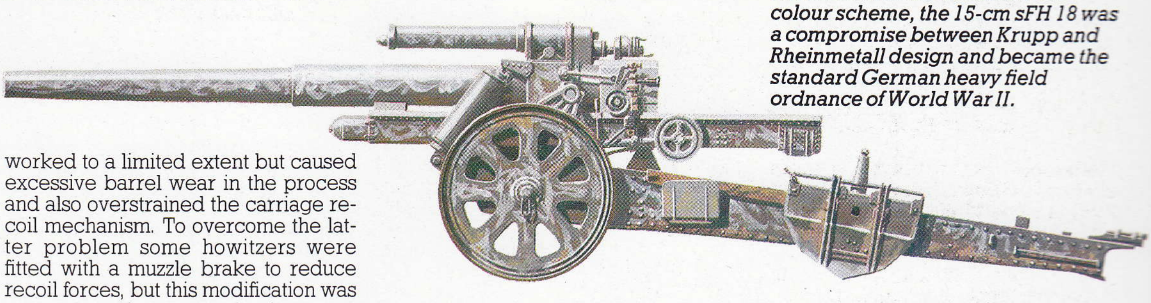
Within Germany the two major artillery manufacturing concerns had been Krupp and Rheinmetall since the turn of the century. Both firms survived World War I intact, but with their usual markets shattered both decided to start again with new products. Thus for both the 1920s was a period of retrenchment and research so that by the time the Nazi party came to power in 1933 both were ready to supply their new customer. The new customer was shrewd enough to invite both parties to submit designs for every new artillery requirement made by the expanding German forces, and thus when a call was made for a new heavy field howitzer each company was ready with a suitable design.

The trouble for the army selectors was that the submissions were as good as each other. Thus the eventual equipment was a compromise, the Rheinmetall ordnance being placed on the Krupp carriage. This selection was made in 1933 and given the designation of **15-cm schwere Feldhaubitze 18 (15-cm sFH 18)**, although the actual calibre was 149 mm (5.87 in). The howitzer quickly became the standard German heavy field howitzer and it was churned out from numerous production lines all over Germany.

The first version of the sFH 18 was intended for horse traction and was towed in two loads, namely barrel and carriage. But before long a version intended to be towed by a halftrack tractor was produced, and this soon became the more common version. It proved to be a sound and sturdy howitzer and served well throughout all of Germany's World War II campaigns. Once the invasion of the Soviet Union was under way in 1941, however, it soon became apparent to the Germans that the piece was outranged by its Soviet 152-mm (6-in) equivalents. Various attempts were made to increase range, including two more powerful propellant charges to be added to the six already in use. These extra charges worked to a limited extent but caused excessive barrel wear in the process and also overstrained the carriage recoil mechanism. To overcome the latter problem some howitzers were fitted with a muzzle brake to reduce recoil forces, but this modification was no great success and the idea was dropped; weapons so modified were designated **15-cm sFH 18(M)**.

As the war went on the sFH 18 was placed on a self-propelled carriage known as the Hummel (bumblebee), and thus formed part of the artillery component of a few Panzer divisions. Not all were used in the field role. Divisions that found themselves installed along the Atlantic Wall defences used their sFH 18s to bolster coastal defences, usually under German navy control. Some sFH 18s were handed out to some of Germany's allies, notably Italy (**obice da 149/28**) and, for a while, Finland (**m/40**).

The sFH 18 was still in use in very large numbers when the war ended in 1945 and for a period the howitzers were used by many armies. Czechoslovakia used an updated version of the sFH 18 until quite recently, and the type was also used by the Portuguese army for a considerable period. Some still survive in parts of Central and South America, and the sFH 18 has surely been one of the soundest and sturdiest of all German artillery pieces.

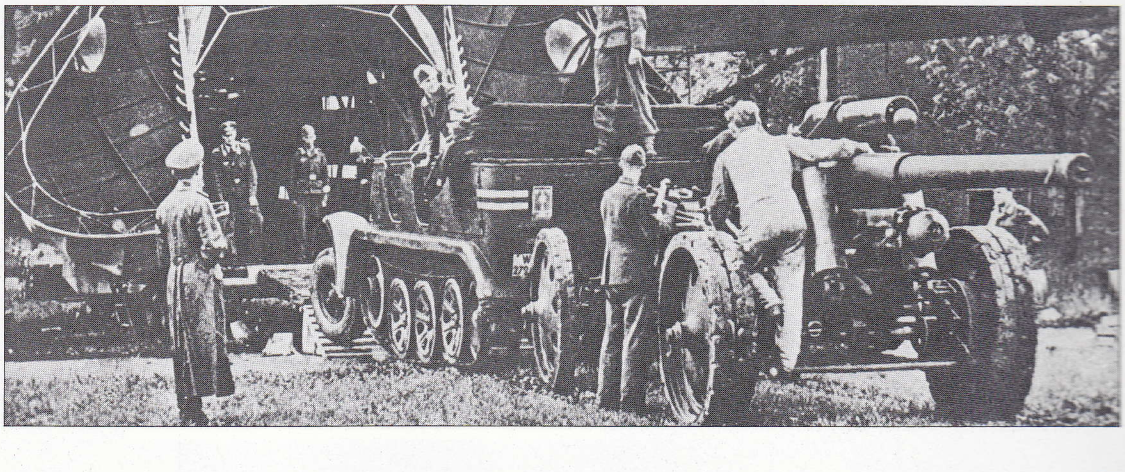


Shown here in an Eastern Front colour scheme, the 15-cm sFH 18 was a compromise between Krupp and Rheinmetall design and became the standard German heavy field ordnance of World War II.

Specification

15-cm sFH 18

Calibre: 149 mm (5.87 in)
Length of piece: 4.44 m (14 ft 6.8 in)
Weight: travelling 6304 kg (13,898 lb) and in action 5512 kg (12,152 lb)
Elevation: −3° to +45°
Traverse: 60°
Muzzle velocity: 520 m (1,706 ft) per second
Maximum range: 13325 m (14,570 yards)
Shell weight: 43.5 kg (95.9 lb)



This 15-cm sFH 18 is being towed into the cavernous mouth of an Me 323 transport by an Sdkfz 7 half track. The majority of German artillery was horse-drawn, but the 15-cm howitzer was modified early in the war to be towed by vehicles.

The Battle for Berlin

After the Sixth Army perished in the frozen hell of Stalingrad, the writing was on the wall for the German war in the East. Hitler's futile holocaust at Kursk the next year only served to accelerate the inevitable, and from then on the Red Army drove remorselessly westward from the central USSR, across Poland and into the heartland of Germany. By April 1945 the thunder of Soviet artillery could be heard from Berlin itself.

By 1945 the Red Army artillery organization had settled down into a coherent arm that exactly suited the Soviet use of massed armies on a huge scale. Each 'front' (army group) had assigned for its own use a full artillery corps consisting of two anti-aircraft and two artillery divisions. These divisions were additional to the artillery allotments made to the rifle and mechanized divisions which frequently had a number of 152-mm (6-in) howitzer batteries, but the artillery divisions held the bulk of the heavy weapons.

Within the artillery division there were a number of artillery brigades, each supported by its own transport battalion and an artillery survey battery for plotting and surveying targets and battery locations. Although there were many variations upon the establishment the usual arrangement was as follows:

1. one heavy howitzer artillery brigade of four batteries, each battery having four troops each with four 152-mm howitzers, making 64 152-mm howitzers to the brigade;
2. one howitzer artillery brigade with four batteries, each battery having four troops each with four 122-mm (4.8-in) howitzers, making 64 howitzers to the brigade;
3. one heavy howitzer artillery brigade with four batteries, each battery having only three troops each with three 203-mm (8-in) Model 1931 howitzers, making 36 203-mm howitzers to the brigade;
4. one mortar brigade with four batteries, each battery having four batteries each with four 160-mm (6.3-in) mortars, making 64 160-mm mortars to the brigade; and
5. one rocket-launcher brigade with a loose organizatión and a variable number of 300-mm (11.8-in) mobile multiple rocket-launchers.

The total manpower for each of these artillery divisions was 12,000, and in addition to their usual motor transport strengths the divisions were usually provided with more transport support units by the front headquarters.

By 1945 the artillery divisions had reached a point where they could be used by the Red Army commanders to almost literally punch their way through opposing German positions. The usual method was for the heavy artillery batteries to align themselves almost wheel to wheel to create massive bombardments that could swamp any enemy position with carpets of projectiles. To the artillery batteries' efforts would be added the fearful fire of the multiple rocket-launchers of all rocket calibres, the artillery divisions adding their 300-mm projectiles.

The massive battering ram of what were often known as 'breakthrough' artillery divisions was a powerful weapon that the Red Army had exploited to the full by 1945, but its one major weakness was an almost complete lack of flexibility. Orders came from on high and at the lower command levels all that was wanted was a total obedience to orders, even when it was sometimes apparent that the guns were firing ammunition at nothing. This lack of flexibility also affected the very nature of the type of battle the Red Army fought. Time and again the artillery and armoured divisions made major breakthroughs against the crumbling German lines, only to halt at a predetermined line to resupply in preparation for yet another set-piece bombardment and battle, and then to advance again.

In this fashion the Red Army approached Berlin. It had been advancing in leaps and bounds ever since the German 6th Army had been encircled in Stalingrad back in November 1942 and, apart from a few occasions when the Germans had been able to take the tactical initiative for a short period with local offensives, the Soviets' westward advances had been relentless: by April 1945 they were on the Oder and there settled down for what was to be their final offensive.

As usual the Soviets prepared with a thoroughness that recalls the massive build-ups to the World War I battles on the Western Front. Huge amounts of war matériel and weapons were brought forward from the war factories still thrumming east of the Urals. In Berlin the sound of artillery fire was an everyday adjunct to what passed for normal life in a wrecked city. Among the smoking heaps of rubble that had once been one of Europe's major cities, military and civil life somehow managed to continue. Civilians were few in number and were by far outnumbered by the military who ranged from the last of the old regular German army to a rabble of 'foreign legions', party organizations and virtually untrained conscripts many of whom were as young as 14 years. By day and night the Allied and Red air forces flew over the city to add to the piles of rubble below and to stoke the ever-burning fires on almost every street.

The doomed city waits

Among all this desolation Hitler was still in his bunker attempting to use what remained of his charisma to command the shattered armed forces and defend what was left of the Third Reich. It was not much. In the West the Allies were still advancing and it was only a matter of time before the Red Army steamroller made yet another push to overwhelm Berlin. But just by remaining in the city, when much of the party and civil administration had already left for the southern hinterland of Germany, Hitler was still able to use his presence to inspire Berlin's defenders to fight on. Thus one of the most evil geniuses of the 20th century used his last reserves of power to condemn thousands more to death at a time when all was already lost. His party henchmen seemed to do what they could to add to the death total. All through the early days of April 1945 squads of party fanatics roamed the debris of Berlin seeking out 'deserters' and hanging them on the spot from nearby lamp posts, so that it was not long before every street in Berlin had its dangling example of the party's waning powers.

Away across the Oder the Soviets already had seen the self-same powers of the party. In their advances across Poland and East Prussia they had already uncovered many examples of concentration camps and all the other excesses of German rule in the East. Within the Soviet Union itself the brutal rule of the *Gauleiters* had already condemned millions of Soviet citizens to death by local forced labour or deportation to the labour camps of the Reich, and the Red Army was in no mood to be generous to a beaten army. As it advanced across East Prussia and into Germany itself the Red Army had carried out its own programme of punishments, looting and all the other happenings that follow battle, and it was ready to make the last humiliating advance into the heart of the Third Reich.

By 16 April 1945 the Soviets were ready and the massed artillery of two armies fell upon the German positions. The two armies, swollen in numbers by injections of extra shock divisions and armour, were commanded by two of the Red Army commanders that the Germans had

A Soviet officer observes the first rounds of a barrage impact on German anti-tank obstacles in front of their positions. The Russians often used their guns in a rolling barrage – walls of explosions which swept before the advancing troops.

Nothing but ruins – the remains of the foreign ministry in Berlin where plans had been drawn up to reshape the map of Europe. Europe had indeed been changed, but not in the manner envisaged by the Germans.

come to fear most, Marshals Konev and Zhukov. In the north Zhukov's 1st Belorussian Front broke through the German lines between Schwedt and Frankfurt an der Oder; to the south Konev's 1st Ukrainian Front broke through between Forst and Görlitz. There was no finesse in these massed attacks. The artillery was arranged wheel-to-wheel in rows, and thundered away for hours before the tanks moved forward. To their fire was added the fearsome noise of the massed batteries of multiple rocket-launchers of all calibres. These were the dreaded 'Katyushas', the 'Stalin Organs' that could devastate large areas of a battlefield with explosive and flying fragments, to say nothing of their morale-sapping whine and crash. To their destruction was added the massed fire of the 152-mm howitzers and the ponderous 203-mm Model 1931 howitzers that were able to seek out and destroy the shelters and strongpoints where the hapless German infantry attempted to find what shelter they could. Farther back behind the front lines the few remaining German batteries were virtually swept away by a torrent of fire that destroyed the guns, gun positions and the remaining stocks of ammunition.

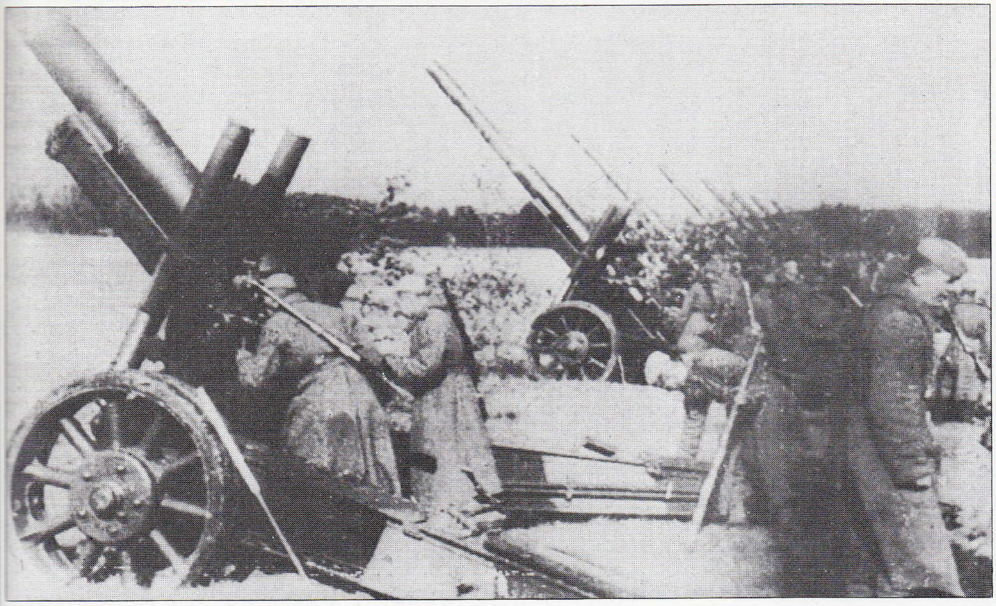
When the bombardment lifted the tanks moved forward. The T-34/85s and the IS-2s lumbered from their hides, carrying with them the 'descent' infantry squads riding on their hulls and with their sub-machine guns and grenades ready to fall upon any infantry positions that were left in a state to defend themselves. By 18 April the Red Army was through the Oder defences and able to range about the virtually untouched farmlands of Pomerania as it moved towards Berlin. The tanks moved with the artillery, stopping every now and again to support the next armoured advance so that within a few days shells were falling on the outskirts of Berlin itself.

Within the city Hitler continued his decline into a state of moral fantasy. Already unhinged by the attempt on his life in the previous July, Hitler's mind withdrew into a realm where the German army and party divisions of 1939 still existed, and he ordered nonexistent divisions about his large-scale maps as though he was still in command of a mighty force. The reality was otherwise. Outside the bunkers what remained of the German army and the party machine shattered into a myriad of individuals who took what precautions for the future that they thought fit. This ranged from murdering old rivals or suspected political opponents to burying home movies and looted treasures from all over Europe. In a final frantic orgy of destruction the party anti-deserter squads carried out their last 'executions' and then ran to the west.

The last German counteroffensive had been ordered by Hitler for 22 April. The advancing Red Army units hardly noticed it as they continued their westward advance. By 27 April Red Army tanks were in the Potsdamer Platz and through the sound of artillery fire the chatter of small arms could be heard, even in the Chancellery bunker where Hitler still held court with an entourage of the party faithful. At that point reality broke through the fantasy and in a last moment of Wagnerian grandeur Hitler shot himself along with the faithful Eva Braun and his dog. Their bodies were burned in the garden outside the bunker and the flames added their small glimmer to the holocaust around them as the Third Reich came to a fiery end.

Around the bunker the Red Army moved into a desolate wilderness of ruined buildings where isolated pockets of resistance still lingered. Many of the remaining strongpoints were manned by various of the German 'foreign legions' who knew only too well what to expect once they fell into Red Army hands, and so preferred to go down fighting. Among these oddments were the remaining members of such Waffen SS units as the 'Legion of St George' culled from the riffraff of British army prisoners-of-war, and the fanatical adherents of the Indian Legion who had often alarmed even their German commanders by their ferocity and dedication to the Nazi cause. With such pockets of resistance the Red Army commanders wasted no time. They simply called forward a number of 152-mm howitzers and sited them close to the source of the resistance. Then the howitzers simply blasted them away, as Red Army cameramen recorded the scene to show workers back in the USSR what their labours had made possible. Thus the Red Army artillery machine was in at the kill. It had paved the route to Berlin all the way from Stalingrad, and despite inflexibility its sheer power had made the final Red Army victory possible.

The Red Army artillery machine is no less powerful today.



With nothing to fear from the spent Luftwaffe, these Soviet 152-mm guns are drawn up almost hub to hub as they lay down a barrage on the surviving German positions. After incessant pounding by massed artillery the Red Army attacked in overwhelming strength.

GERMANY

15-cm Kanone 18

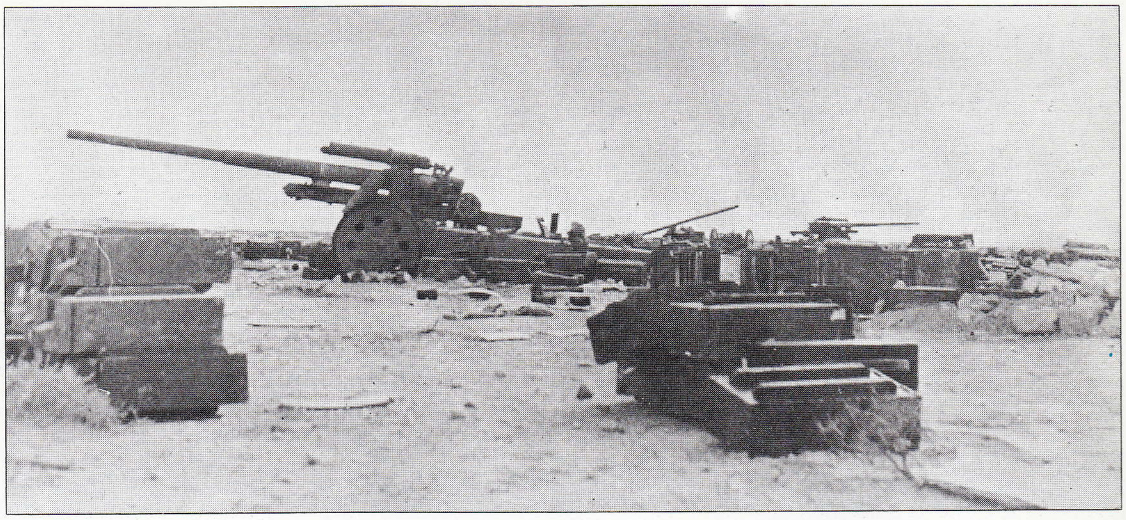
When a German army requirement for a heavy gun to arm the new divisional artillery batteries was made in 1933, Rheinmetall was able to land the contract. Using the same carriage as that submitted for the 15-cm sFH 18 competition, Rheinmetall designed a long and good-looking gun with a range of no less than 24500 m (26,800 yards), which was well in excess of anything else available at the time. Production did not begin immediately for at the time priority was given to the sFH 18, so it was not until 1938 that the army got its first examples as the **15-cm Kanone 18 (15-cm K 18)**.

When the army began to receive the weapon it was very happy with the range and the projectiles, but was less than enchanted with some of the carriage features. One of these was the fact that as the gun was so long the gun and carriage could not be towed together except over very short distances. For any long move the barrel had to be withdrawn from the carriage and towed on its own special transporter carriage. The carriage itself was towed on its own wheels and a small limber axle carrying another two wheels. All this took time, an undesirable feature when getting the gun into and out of action, and this time was increased by another carriage feature, the use of a two-part turntable onto which the gun was lifted to provide 360° traverse. This too had to be got into and out of action, and the carriage was equipped with ramps and winches so that even when sectionalized for towing it made up into two heavy loads.

As if the time-consuming installation and removal drawbacks were not enough, the rate of fire of the K 18 was at best two rounds per minute. Not surprisingly, the gunners asked for something better but in the interim the gun was in production and the gunners had to put up with things as they were. As things turned out, many of the K 18s were allocated to static coastal-defence batteries or garrison divisions where their relative lack of mobility was of small account. Not surprisingly, the coastal batteries soon found that the K 18 made a good coastal gun: its long range and the easily-traversed carriage made it ideal for the role, and it was not long before special marker projectiles using red dyes were produced specially for the marking and ranging of the guns.

Production of the K 18 ended well before the end of the war in favour of heavier weapons. But for the guns already in the field a range of ammunition in addition to the marker shells was made available. There was a special concrete-piercing shell with a much reduced explosive payload, and another was just the opposite, being a thin-walled shell with an increased explosive content for enhanced blast effect.

On paper the K 18 should have been one of Rheinmetall's better designs. It had an excellent range and fired a heavy projectile, but for the gunners who had to serve the thing it must have provided the source of a great deal of hard work. Gunners are always trained to get in and out of action as rapidly as possible, whatever weapon they are using, but the K 18 seems to have provided them with something that only hard work could turn into an acceptable battlefield weapon.



A 15-cm K 18 forms the centrepiece of a German artillery park captured by the British in Libya. This Rheinmetall design had an impressive range, but was dangerously time-consuming to deploy or withdraw.

Specification

15-cm K 18

Calibre: 149.1 mm (5.87 in)

Length of piece: 8.20 m (26 ft 10.8 in)

Weight: travelling 18700 kg (41,226 lb) and in action 12460 kg (27,470 lb)

Elevation: −2° to +43°

Traverse: on platform 360° and on carriage 11°

Muzzle velocity: 865 m (2,838 ft) per second

Maximum range: 24500 m (26,800 yards)

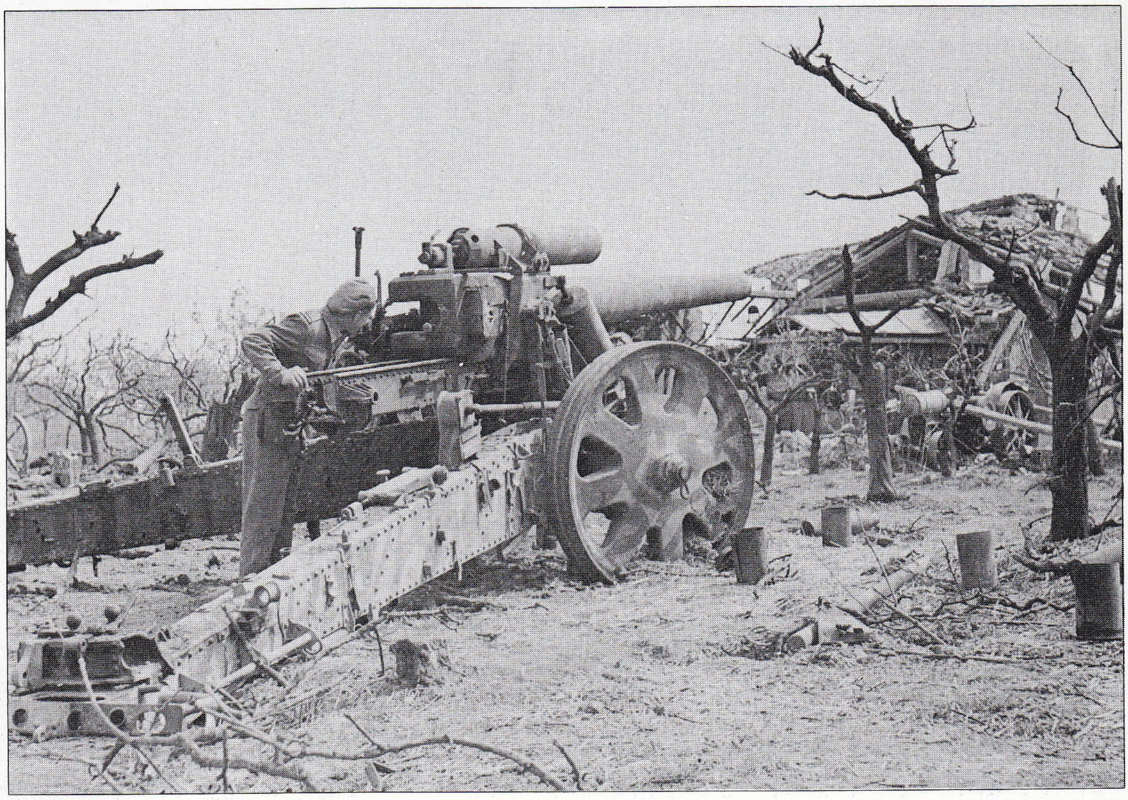
Shell weight: 43 kg (94.8 lb)

GERMANY

15-cm Kanone 39

The gun that became known to the Germans as the **15-cm Kanone 39 (15-cm K 39)** came to them via a roundabout route. The gun was originally designed and produced by Krupp of Essen for one of its traditional customers, Turkey, during the late 1930s. The gun was intended to be a dual field/coastal-defence gun and so used a combination of split-trail carriage allied with what was then an innovation, namely a portable turntable onto which the gun and carriage would be hoisted to provide 360° traverse, a feature very useful in a coastal-defence weapon. Two of the ordered batch had been delivered in 1939 when World War II broke out, and there was then no easy way of delivering any more to Turkey. With a war on its hands the German army decided it needed as many new field guns as possible and the design was taken into German service without modification as the 15 cm Kanone 39, and the type remained on the production lines at Essen for the German army alone.

Thus the German army found itself



The 15-cm Kanone 39 was a Krupp design commissioned by Turkey. Only two examples had been supplied when war broke out and the German army adopted it instead, along with large stocks of ammunition built to Turkish specifications.

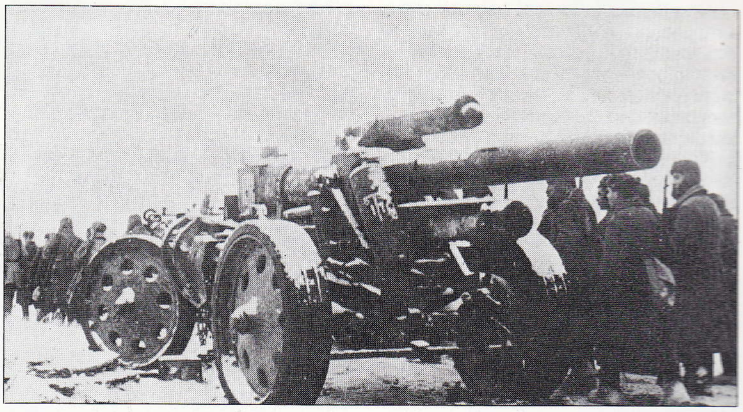
with a large and useful gun that had to be transported in three loads: barrel, carriage and turntable. For most purposes the turntable was not really necessary and was only used when the gun was emplaced for coastal defence; the unit consisted of a central turntable onto which the carriage was placed, a series of outrigger struts and an outer traversing circle. The whole turntable was made of steel, and in use was anchored in place. The spread trails were secured to the outer traverse circle, and the whole gun and carriage could then be moved by using a hand crank arrangement. This platform attracted a great deal of attention from many other design teams, including the Americans who used it as the basis for the 'Kelly Mount' used with 155-mm (6.1-in) M1 guns.

The K 39 could fire conventional German ammunition, but when first introduced into service it came with sizable stocks of ammunition produced for Turkish use and to Turkish specifications. This involved a three-charge system and included a high explosive shell and a semi-armour-piercing projectile originally intended by the Turks to be used against warships. All this non-standard ammunition was gradually used up before the Germans switched to their normal ammunition types.

By that time the K 39 was no longer in use as one of the standard weapons of the German army. The full production run for the army was only about 40, and this was understandably thought to be too awkward a number for logistical comfort. Thus the K 39s were diverted to the training role and then to the Atlantic Wall defences, where they reverted to their intended purpose. On the static Atlantic Wall sites the turntables could be carefully emplaced to best effect and the guns could use their long range to good purpose.

Specification

15-cm K 39
Calibre: 149.1 mm (5.87 in)
Length of piece: 8.25 m (27 ft 0.8 in)
Weight: travelling 18282 kg (40,305 lb) and in action 12200 kg (26,896 lb)
Elevation: −4° to +45°
Traverse: on turntable 360° and on carriage 60°
Muzzle velocity: 865 m (2,838 ft) per second
Maximum range: 24700 m (27,010 yards)
Shell weight: 43 kg (94.8 lb)



A 15-cm K 39 lies abandoned on the frozen steppes, providing a subject of interest for the columns of Soviet troops marching westwards. The K 39 was eventually withdrawn to a training role for logistic reasons. Some were emplaced in the Atlantic Wall as a coastal defence gun.

GERMANY

17-cm Kanone 18 and 21-cm Mörser 18

When it came to artillery design in the years during both world wars, Krupp of Essen can be regarded as the virtual leaders. The company's sound approach, coupled with the thorough development of innovations, led to some of the most remarkable artillery pieces in use anywhere in their day, and one of these innovations featured on what were two of the most remarkable artillery pieces in service during World War II. This innovation was the 'double recoil' carriage on which the normal recoil forces were first taken up by the orthodox recoil mechanism close to the barrel and then by the carriage sliding inside rails set on the bulk of the travelling carriage. In this way all the recoil forces were absorbed with virtually no movement relative to the ground, and firing accuracy was thus enhanced. Further improvements also ensured that the entire barrel and carriage could rest on a light firing platform that formed a pivot for easy and rapid traverse.

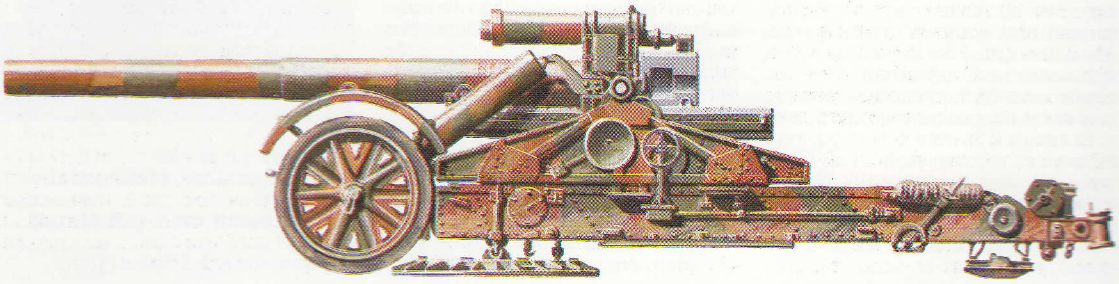
This double-action carriage was used mainly with two Krupp weapons. The smaller was the **17-cm Kanone 18** (actual calibre 172.5 mm/6.79 in) and the larger the **21-cm Mörser 18** (the Germans often followed the continental practice of calling heavy howitzers a mortar). These two weapons were first introduced in 17-cm (6.8-in) form in 1941 and in 21-cm (8.3-in) form in 1939. Both proved to be excellent weapons and demand was such that Krupp had to delegate extra production to Hanomag at Hannover. Of the two weapons priority was at first given to the **21-cm Mrs 18**, and a wide range of special projectiles was developed for this weapon, including concrete-piercing shells. But with the advent of the **17-cm K 18** it soon became apparent that the 17-cm shells were only marginally less effective than their 21-cm equivalents, and that the 17-cm gun had a much greater range (29600 m/32,370 yards as opposed to 16700 m/18,270 yards). Thus in 1942 priority was given to the 17-cm K 18, production of the 21-cm Mrs 18 ceasing.

But the 21-cm Mrs 18 remained in use until the end of the war, as did the 17-cm K 18 which continued to impress all who encountered it, either as recipients of the 68-kg (149.9-lb) shell or as gunners. In fact the Allies sometimes acted as gunners, for in 1944 some Allied batteries used captured 17-cm K 18s when ammunition supplies for their normal charges were disrupted by the long logistical train from Normandy to the German border. For all their weight and bulk, both the 17-cm (6.8-in) and 21-cm pieces were fairly easy to handle. A full 360° traverse could be made by only one man, and although both pieces had to be carried in two loads the carriage was well equipped with winches and ramps to make the process of removing the barrel from the carriage a fairly light and rapid task. For short distances both weapons could be towed in one load by a heavy halftrack tractor.

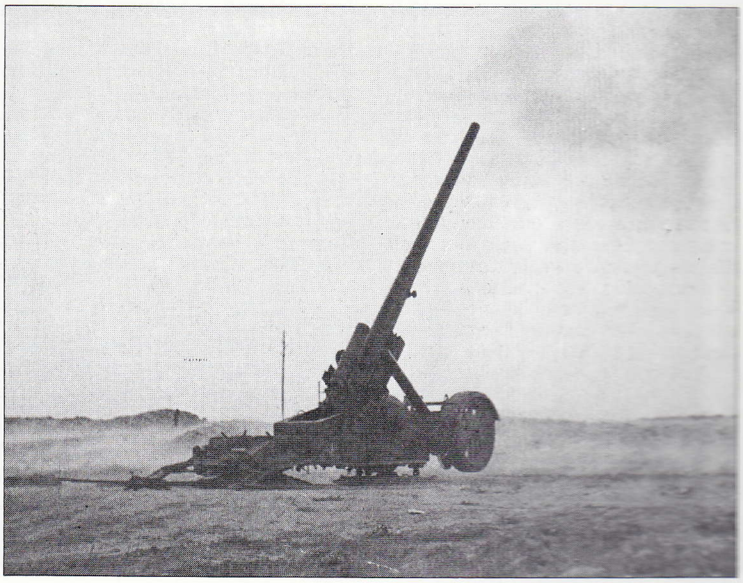
Specification

17-cm K 18
Calibre: 172.5 mm (6.79 in)
Length of piece: 8.529 m (27 ft 11.8 in)
Weight: travelling 23375 kg (51,533 lb) and in action 17520 kg (38,625 lb)
Elevation: 0° to +50°
Traverse: on platform 360° and on carriage 16°
Muzzle velocity: 925 m (3,035 ft) per second
Maximum range: 29600 m (32,370 yards)
Shell weight: HE 68 kg (149.9 lb)

21-cm Mrs 18
Calibre: 210.9 mm (8.3 in)
Length of piece: 6.51 m (21 ft 4.3 in)
Weight: travelling 22700 kg (50,045 lb) and in action 16700 kg (36,817 lb)
Elevation: 0° to +50°
Traverse: on platform 360° and on carriage 16°
Muzzle velocity: 565 m (1,854 ft) per second
Maximum range: 16700 m (18,270 yards)
Shell weight: HE 121 kg (266.8 lb)



A 21-cm Mörser 18, so called because the Germans referred to their heavy howitzers as mortars, used the same carriage as the 17-cm K 18.



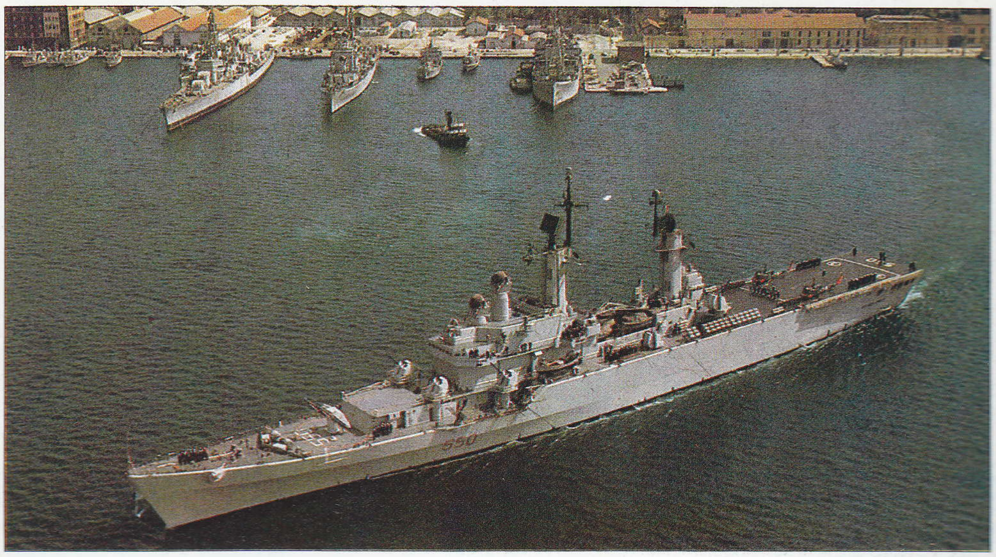
As the 8th Army advanced deeper into Tunisia, this 17-cm K 18 was captured intact and used against its Afrika Korps former owners. Longer ranged than the 21-cm M 18, production facilities were devoted exclusively to the K 18 after 1942.

Italian Navy

From 1947 to the present, the major problem faced by the Italian navy has not been an external threat but rather a shortage of money. Almost every major construction programme has either been postponed or partly cancelled because of the lack of funds, and this has meant that ships such as the 'Impavido' class of missile destroyers, built in the early 1960s as part of the first post-war building programme, are still in front-line operational service even though their usefulness in modern naval warfare must now be questionable. However, the 1975 Legge Navale (naval law) authorized a 10-year building programme to provide new construction and fully to modernize some of the older ships in order to update the fleet to meet NATO requirements. Despite this worthy intention, parts of the plan, such as the two improved 'Audace' class replacements for the 'Impavido' class units, have had to be postponed because the total construction and rebuilding costs have overrun the initial estimates. Although suffering badly from these economic setbacks, the Italian navy has a manpower strength of 38,650 (excluding 1,500 naval airmen and 750 marines) and is engaged in expanding its capabilities and this has provided a stimulus to the indigenous shipbuilding industry that is helping to ensure that Italy remains at the head of the European warship exporters' league.

The most important unit in the new Legge Navale programme is the light aircraft-carrier *Guiseppe Garibaldi*, which is currently being fitted out by Italcantieri. She is due to replace the two elderly helicopter cruisers *Andrea Doria* and *Caio Duilio* and will take over the fleet flagship duties from the third helicopter cruiser *Vittorio Veneto*. Although officially designed to operate only the licence-built Agusta-Sikorsky SH3D Sea King ASW helicopter or its Agusta/Westland EH101 replacement, the configuration of the ship (with its 'flush' through deck and inclined ramp at the forward end of the flightdeck) makes it obvious that V/STOL jet aircraft can be embarked. Such a move would cause a major political storm for the navy as the Italian constitution permits only the air force to operate fixed-wing aircraft. The *Vittorio Veneto*, now fitted with the long-range Standard SM1ER SAM missile, Otomat anti-ship missiles and ASROC ASW missiles, can still operate effectively either in support of the carrier or in her own right as an ASW hunter-killer group leader providing both an ASW helicopter screen around the force and the facilities necessary for helicopter maintenance.

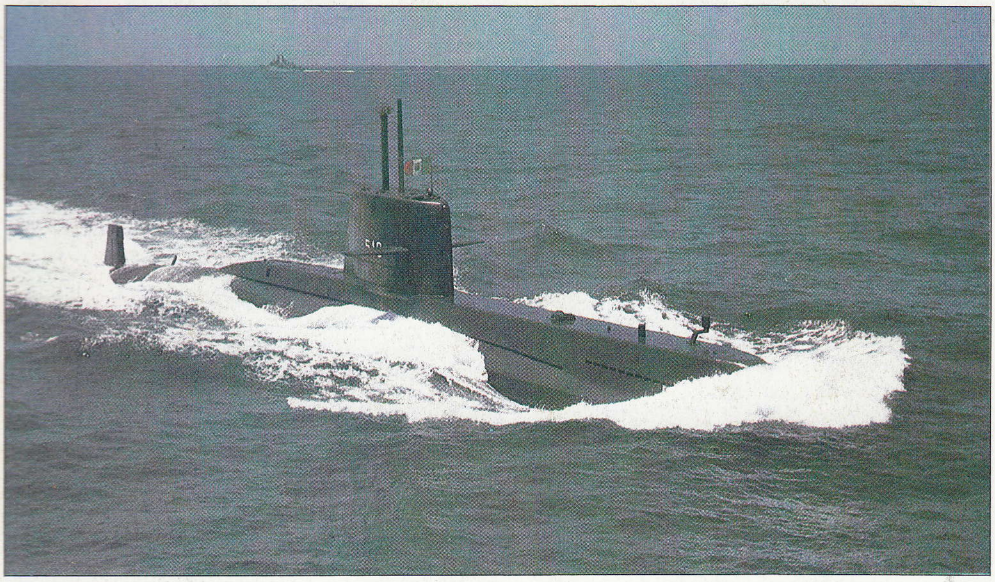
The medium-range area SAM defence to the carrier and ASW task groups is provided by the two 'Impavido' and two 'Audace' class guided-missile destroyers with their Standard SM1MR missiles. These ships are assisted by the eight 'Maestrale' class and two 'Alpino' class ASW frigates which provide the surface ship screens. The modern 'Maestrales' are an enlarged version of the four 'Lupo' class anti-surface warfare convoy escort frigates, and carry an enhanced Otomat SSM missile battery as their main armament and one rather than two helicopters of the ASW variant. Coastal convoy defence and ASW duties are at present the task of the eight corvettes of the 'De Cristofaro' and 'Albat-



Vittorio Veneto *is the fleet flagship of the Italian navy and will remain so until the light aircraft-carrier* Guiseppe Garibaldi *is fitted out. Mounting a formidable array of anti-ship and ASW missiles, she carries nine AB.212 helicopters to screen an ASW group.*

Although their hulls are simply bigger versions of the 'Impavido' class, Audace *and* Ardito *are much more effective vessels. Carrying one or two ASW helicopters, they are equipped with a powerful anti-aircraft battery and are soon to be fitted with Otomat SSMs.*

12 PASS



Armed with six 533-mm (21-in) torpedo tubes, the diesel-electric attack submarine Nazario Sauro *was ordered in 1967 but commissioned only in 1980 after defence cuts caused her cancellation until 1972, when she was re-ordered.*

ros' classes. These elderly vessels are to be replaced over the next few years by an eventual total of 12 new-build 1,300-ton corvettes, of which the first four (*Minerva, Urania, Danaide* and *Sfinge*) have just been ordered from CNR.

The submarine force is relatively modern, and comprises eight hunter-killers of the 'Nazario Sauro' and 'Enrico Toti' classes, plus two early 1950s period ex-American 'Tang' class boats. These latter craft are due to be replaced by another two units of an improved 'Nazario Sauro' design for which a contract has been placed with Italcantieri. Armed with the 20-km (12.4-mile) range electrically-powered and wire-guided A184 active-passive acoustic-homing torpedo (plus a variety of ground mine types) the Italian boats are very manoeuvrable and are ideally suited for operating in the restricted waters of the Mediterranean.

Apart from the submarine the other major threat that the Italian navy has to be able to overcome around its coasts and at several strategic 'choke points' within its sphere of influence is the sea mine. The need for a large number of minesweepers and minehunters is obvious as almost 90 per cent of the country's strategic imports such as oil come by sea and all the routes to the major ports pass through relatively narrow channels. The mine-countermeasures force to deal with this has always been of limited size and often of marginal effectiveness. At present it consists of four ocean, 14 coastal and four inshore minesweepers backed by nine minehunter conversions. All of the units are either ex-American or constructed to NATO designs of the 1950s. To update the force and replace the least effective units four GRP minehunters of the 'Lerici' class are being built by Intermarine. A further six units probably to the modified 'Lerici' design known as the 'Gaeta' class will be built. Equipped with a licence-built version of the AN/SQQ-14 'Squeaky Fourteen' minehunting sonar, these ships use a single remotely-controlled underwater mine-disposal vehicle known as MIN, together with six divers for the identification and destruction of both moored and ground mines as well as a conventional Oreposa towed mechanical sweep system.

The navy's small amphibious force has a single marine infantry battalion for which a new LPD has been ordered from CNR for delivery in the late 1980s. This new ship will be able to carry up to 400 fully equipped troops, 36 APCs, three LCMs in a floodable dock and three LCVPs on the upper deck. As an alternative to the APCs and LCMs she can carry up to 30 MBTs or their equivalents. The upper deck will be of the carrier type with an island on the starboard side. It will be able to operate helicopters up to the size of the Boeing Vertol CH-47 Chinook.

Built entirely of aluminium, the 'Sparviero' class hydrofoils are capable of up to 50 kts and carry a pair of Otomat SSMs. In the confined waters around Italy their short range and limited armament are not a serious disadvantage.

Order of battle

Surface vessels

one light anti-submarine warfare carrier: *Guiseppe Garibaldi* (C551) fitting out
three helicopter cruisers: *Vittorio Veneto* (C550), *Andrea Doria* (C553) and *Caio Duilio* (C554), the last being used as a training ship
four guided-missile destroyers: *Audace* (D550), *Ardito* (D551), *Impavido* (D570) and *Intrepido* (D571)
10 anti-submarine warfare frigates: *Maestrale* (F570), *Grecale* (F571), *Libeccio* (F572), *Scirocco* (F573), *Aliseo* (F574), *Euro* (F575), *Espero* (F576), *Zeffiro* (F577), *Alpino* (F580) and *Carabiniere* (F581)
four surface warfare frigates: *Lupo* (F564), *Sagittario* (F565), *Perseo* (F566) and *Orsa* (F567)
eight corvettes: four 'De Cristofaro' class and four 'Albatros' class, with four of an eventual 12-ship replacement class on order
seven fast attack hydrofoils (missile): seven 'Sparviero' class
four fast attack craft (convertible): two 'Freccia' class and two 'Lampo' class each able to serve as a gunboat, torpedo craft or fast minelayer
55 amphibious warfare vessels: 32 LCVPs, 18 LCM3s, two 'De Soto County' class LSTs, one special forces depot ship, two 'Higgins' class frogman support craft and (on order) one LPD
32 mine warfare vessels: four 'Aggressive' class ocean minesweepers, three 'Adjutant' class coastal minesweepers, six 'Adjutant' class minehunters, 11 'Agave' class coastal minesweepers, three 'Agave' class minehunters, four 'Aragosta' class inshore minesweepers and (on order) four 'Lerici' class minehunters (with another six planned)
three survey ships
two underway replenishment tankers
100 or more service and auxiliary vessels

Submarines

four 'Toti' class patrol submarines: *Attilio Bagnolini* (S505), *Enrico Toti* (S506), *Enrico Dandolo* (S513) and *Lazzaro Mocegino* (S514)
four 'Sauro' class patrol submarines: *Nazario Sauro* (S518), *Feciadi di Cossato* (S519), *Leonardo da Vinci* (S520) and *Guglielmo Marconi* (S521)
two 'Tang' class patrol submarines: *Livio Piomarta* (S515) and *Romeo Romei* (S516), to be replaced by two more 'Sauro' class boats

Marine infantry

San Marco marine infantry battalion group with 30 VCC-1 armoured infantry fighting vehicles, 24 LVTP-7 amphibious armoured personnel carriers, 16 81-mm mortars, eight 106-mm recoilless rifles, and six Milan anti-tank missile launchers